

FLIGHT

The
AIRCRAFT
ENGINEER
&
AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 603 (No. 29, Vol. XII.)

JULY 15, 1920

SECOND SHOW NUMBER, ONE SHILLING.

Flight

The Aircraft Engineer and Airships

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C. 2
 Telegrams: Truditur, Westcent, London. Telephone: Gerrard 1828

Annual Subscription Rates, Post Free

United Kingdom .. 28s. 2d. Abroad.. .. 33s. 6d.*

These rates are subject to any alteration found necessary under abnormal conditions

* European subscriptions must be remitted in British currency

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DIARY OF FORTHCOMING EVENTS.

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

July 7 to 21	Exhibition of Aircraft Paintings by Mr. Geoffrey Watson, at Brook Street Art Gallery, 14, Brook Street, W., in Aid of R.A.F. Memorial Fund
July 9 to 20	S.B.A.C. International Aero Exhibition at Olympia
July 17 to 31	Seaplane Contests at Antwerp
July 24 ...	Aerial Derby at Hendon
Aug. 3 ...	Air Ministry Competition (Large and Small Type Aeroplanes)
Aug. 28 & 29	Schneider International Race, Venice
Sept. 1 ...	Air Ministry Competition (Seaplanes)
Sept. ...	International aviation week (with competitions) at Brescia, Italy
Sept. 8, 9 and 10	Fédération Aéronautique Internationale Conference, Geneva
Sept. 27 to Oct. 2	Gordon-Bennett Aviation Cup, France.
Oct. 23 ...	Gordon-Bennett Balloon Race, Indianapolis, U.S.A.

EDITORIAL COMMENT



The Aero Show at Olympia

THREE weeks ago we ventured the prophecy that the Aero Show, which was opened at Olympia on Friday last, would be by far the most interesting and comprehensive exhibition of its kind hitherto held in any part of the world. This may have been going rather far in advance of the actual advent of the Show, but now that the exhibition is with us we really feel that we might have gone a long way beyond this seemingly daring statement, and still have been within the limits of the strict letter of the truth. The last Paris Aero Show was an exceedingly interesting and informative function, but it was held too soon after the end of the War for the full effect of perspective to be given rein. It is because a sufficient interval has elapsed for those concerned with the organisation of the Olympia Show to have been able to quietly and at leisure take stock of what was best worth while, and what could with advantage be left out, that they have staged for us an exhibition such as has never been seen before—one that is replete with absorbing interest and vastly educative withal.

It is no part of our present intention to give a review of the many features of superlative interest. Our readers can gather from our very full reports of the Show all that is necessary to enable them to follow the trend of things as it is demonstrated at Olympia. It would, furthermore, be impossible to touch upon these matters in comment such as these columns are devoted to without risk of seeming invidiousness. We cannot refrain, however, from expressing the gratification we feel at the interest displayed by the Air Ministry, which takes shape in the really wonderful official exhibits which are staged at Olympia. They are, as they are obviously intended to be, an object-lesson in the evolution of aviation. Not only do they graphically demonstrate the many and diverse steps by which the science has arrived at its present stage of, shall we say, relative perfection, but what is even more interesting, they show how and by what process of reasoning and evolution those steps were resolved upon. In a word, the official exhibits constitute a graphic and

easily appreciated story of the progress of aviation from its earliest times down to the present day. Nothing more calculated to engross the interest of the public, expert and lay, could have been devised, and we most sincerely and heartily congratulate the Air Ministry, and Gen. Sykes in particular, on the series of happy thoughts which prompted this manner of demonstrating a moving story. The more so are the thanks of all concerned due to them, since we understand that the whole thing has been done with the absolute minimum of expenditure of money. In fact, so insignificant has been the sum expended that it is marvellous that it could have been done within the limits of the funds allotted. It is refreshing to be able to record this in times when the money of the taxpayer has apparently ceased to have value in the eyes of Government Departments. Naturally, we do not feel at liberty to state the exact amount which the Air Ministry exhibit has actually cost, but we will venture to say that had it been ten times as much we should have adjudged it well spent in view of the enormous interest it possesses.

That the Show will prove a success from the "gate" point of view we sincerely hope. At the moment of writing the attendance of the public has not been quite up to the hopes of the promoters, but there is plenty of time between now and the closing date for the attendances to receive a substantial impetus. The opening days of any exhibition are never remarkable for big attendances of the sight-seeing public, and the Aero Show is thus no exception to the rule. There is no doubt the public does take an enormous and increasing interest in aviation, and as soon as it really awakes to the fact that the Show is in being we look to a substantial accretion of interest and record attendances. Certainly it is an exhibition which no one should on any account miss seeing, and from all points of view except the "gate" there can be no question of its unqualified success.

German Aircraft

While we are in nowise inclined to minimise the magnitude of the future threat from the air which may come from Germany, we cannot help deploring the state of panic into which some allow themselves to be led by the silly reports which now and again become current as to the vast preparations which that country is alleged to be making, emphasis to which was given at the inauguration of the Aero Show. In the House of Commons recently Mr. Churchill was asked if it were true that Germany is preparing a fleet of 47,000 aeroplanes. If his interlocutor had stopped to think he would never have asked so ridiculous a question. By the terms of the Peace Treaty, Germany has not as yet been allowed to construct any kind of military aircraft. Obviously, then, it is scarcely possible that she should be building; or be about to build, such an enormous number of aeroplanes. Nor can she set her aircraft industry going properly for many months to come. As to the figure, Mr. Churchill pointed out that 47,000 is approximately the number of machines which were built in Germany, under intensive conditions of production, during the five years of war. In view of this fact it is highly improbable that she could build anything like the number under peace conditions for many years to come.

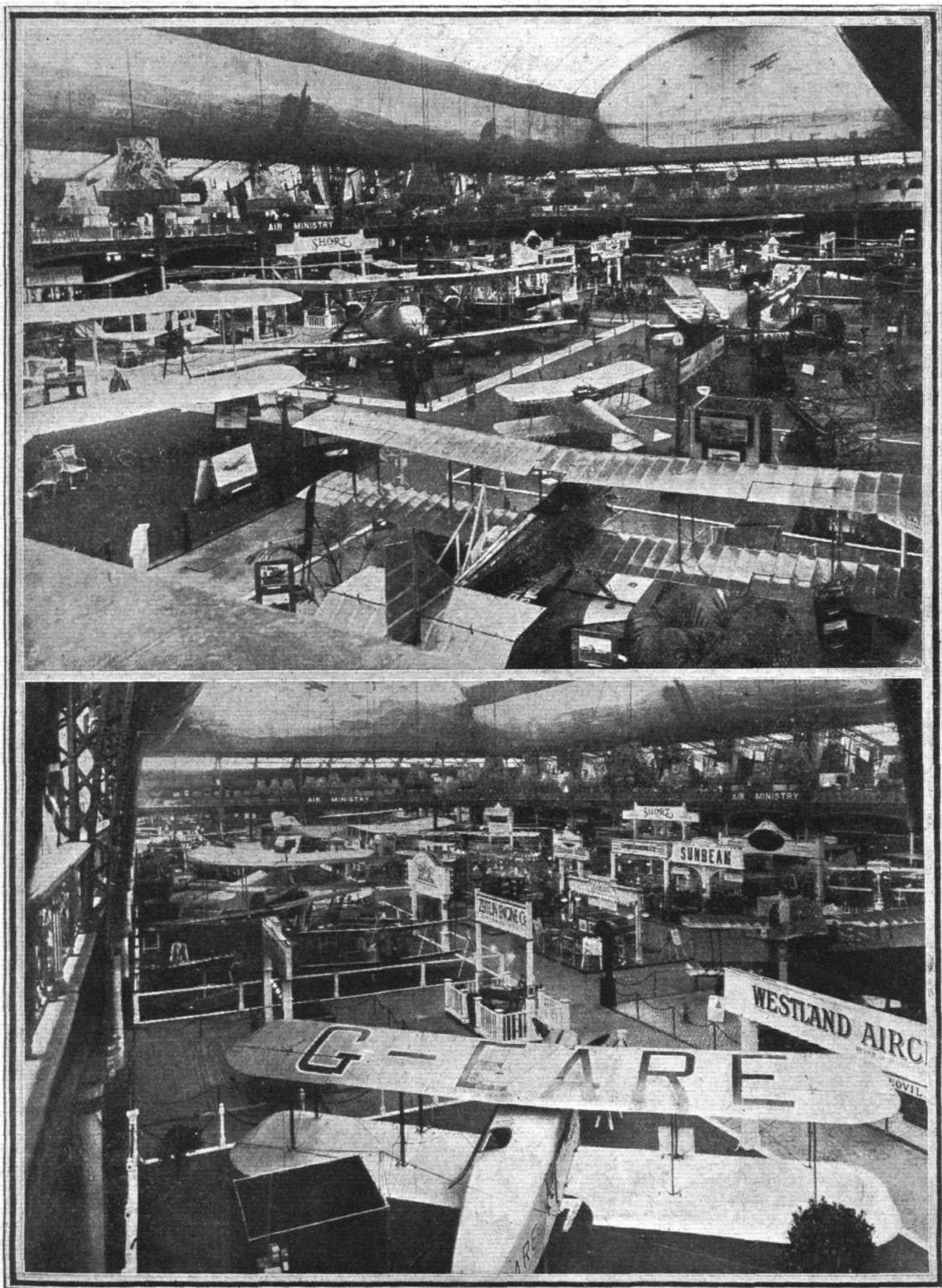
On the other hand we are quite convinced that there is a strong militarist party in Germany which

has dreams of revenge for her defeat in the world War, and that it is to the air they look for the consummation of their aims. Therefore, it will be well that the Allied Governments should keep a very watchful eye on the development of aviation in the country of our late enemy and should suppress with a ruthless hand the construction of more machines than can be legitimately employed in commercial expansion. The question is one of considerable difficulty, because of the almost impossible nature of the task of defining precisely what number of aircraft may be necessary for the purposes of commerce, and particularly because of the difficulty of deciding between types. Nothing is so easily capable of being converted from the purposes of peace to those of war than the aeroplane and the airship. The big Handley-Page machine which is used for conveying passengers and mails from London to Paris today can, with the minimum of trouble and work, be equally well used for bombing Berlin next week. So difficult is the problem that we are driven to the conclusion that it is in the expansion of our own commercial services and the consequent building up of a powerful aerial reserve that the counter to any sinister intentions the Germans may harbour is to be found, rather than in any far-reaching attempt to cripple German aviation.

The Report on Civil Aviation

Answering Gen. Seely recently, Mr. Churchill said that the Report of Lord Weir's Committee on Civil Aviation was still under consideration by the Government. No final decision had yet been reached, but it was hoped that it would be possible to make some announcement before the end of the present month. It is to be hoped that the decision will be taken speedily, and that when it is announced it will be found that the Government has been able to see eye to eye with the Committee. It may be true, as Mr. Churchill stated, that a considerable amount of progress has been made in civil aviation, but there would have been a great deal more if the Government had given its decision earlier and thus allowed the industry and others concerned to know exactly where they stand in relation to the promised encouragement by the State.

For our own part we are not so anxious to know what the Government attitude is to be, because of the effect it will produce on civil aviation purely as such. That is a serious question, admittedly, but it is so bound up with questions affecting Imperial air defence that we deplore the loss of every day that elapses while the Government is making up its mind. It is now about fifteen months, more or less, since the Advisory Committee made its first recommendations, yet nothing in particular has been done, and we seem as far as ever from a final decision as to future policy. As we have repeatedly urged, and as the Committee agrees, it is by the encouragement of civil flying and the expansion of the industry to meet the needs of defence that we can build up a great reserve of trained pilots and machines ready to fit into our organisation for war should it be forced upon us. It is the cheaper and the better way of building up a great Air Force, ready to take its part in Imperial defence almost at a moment's notice. To create and maintain a correspondingly large margin of power by means of an expansion of



THE AERO SHOW AT OLYMPIA : General views of the main hall exhibits. Top : From the Blythe Road end.
Below : From Addison Road end

the active Air Force would cost far too much money for an impoverished and cruelly taxed country to afford. Still less can we afford to again take the appalling risks that so nearly landed us in disaster in the late war, and if there were no other way we should have to face the expenditure and create such an Air Force as would secure us against all possibility of overwhelming attack by the air. It is not necessary, however, if the Government will take the advice of its own Committee and lay down a solid, continuous policy which will result in building up such a reserve as we have always argued is the minimum with which we can rest content and secure against aggression. As we have said in another article, there is a powerful party in Germany which looks forward to revenge. Nothing could so encourage that party to persevere in its aims and to make the attempt to achieve them by surprise as the knowledge that this country was unprepared either to resist aggression or to punish it with interest. Nothing, on the other hand, would act as so powerful a deterrent as the knowledge that the game was not worth the candle, and that any attempt to break the peace would be visited with punishment instant and adequate.

Aerial Mail Charges

Mr. Harper, who acts as technical secretary to the Civil Aerial Transport Committee, is doing excellent propaganda work in the columns of the *Daily Mail*, particularly in relation to the question of the carriage of mails by aeroplane. In a recent article he points out that as a result of the international postal conference in Madrid there is strong reason for the belief that before long it will be announced that international postal charges, so far as concerns the Continent of Europe, will be increased to 5d. per letter. He goes into figures to show that—the aeroplane now having proved itself safe and reliable—the Post Office should force all first-class mail matter into the air.

This is a text which we ourselves have been preaching from for a considerable time past, and we are thus exceedingly pleased to see that so powerful an organ of opinion as the *Mail* is taking the same line.

The article to which we have referred shows that the average weight of first-class matter conveyed

between this country and Paris represents a load of from 800 to 1,000 lbs. daily. Assuming it at the former figure, and sending it by air at the rate now quoted for bulk goods, viz., 1s. 3d. per lb., and reckoning, as the Post Office does, that 35 letters go to the pound, the charge for air transport works out at less than ½d. per letter. This argues that the Post Office should be able to send all first-class matter by air from London to Paris at a cost well within the present fee of 2½d. per letter, including all costs of despatch and handling. All the charges for boat and train would be saved, and even after paying for aerial transport at 100 miles an hour, with its consequent saving of time, and incidentally the encouragement of the aircraft industry which would accrue, there would still be a margin of 2d. per letter to pay for connections between aerodromes and cities and for costs of delivery. All the facilities exist. The machines fly regularly day after day, and all the Post Office has to do is to send its vans to the air port to deliver or pick up the mails.

Mr. Harper asks the very pertinent question: If it pays air transport companies to carry goods in bulk at the reduced rates they are now quoting—and it is to be assumed that it does—why should they not be given G.P.O. mails to carry in bulk at the same rates? If this were done we could have air-mail transport to the Continent without any extra fees or formalities at all. Mails in bulk at the ordinary postage rates would simply be taken and put into the aeroplane as being a faster vehicle than the train. This is what is being done in America to-day.

We confess we cannot give the answer. We ourselves have been hammering away at the self-same problem for a very long time past, but, like all Government Departments, the Post Office is hard to move. The official method is to find a comfortable rut and proceed along it, deviating neither to the left nor to the right. Change of outlook, or alteration in method, is an abomination, and thus we see that nothing is or can be done except under the heaviest pressure from outside. When the business community insists that the mails shall be carried by air, and the P.M.G. is told by his Cabinet colleagues that unless his Department does something there is danger of the Government losing votes, we shall get the mails into the air.

That is the way we are coming to regard the matter.

African Flyers Honoured

It was announced in a supplement to the *London Gazette* on July 13, that the King has been pleased to approve of the following rewards in recognition of the valuable services rendered to aviation in the experimental flight (Vickers-Vimy-Rolls machine), organised by *The Times* newspaper, in an attempt to fly from England to South Africa. The flight commenced at Brooklands, Surrey, on January 24, 1920, and ended at Tabora (2,628 miles from Cairo) on February 26, 1920, at which point the attempt to continue the flight to Cape Town had to be abandoned.

The Air Force Cross

Capt. FRANK CROSSLEY GRIFFITHS BROOME, D.F.C., late Royal Air Force.

Capt. STANLEY COAKERELL, late Royal Air Force.

The Air Force Medal

8085 S./M. 1 JAMES WYATT, late Royal Air Force (Engineer).

Mr. CLAUDE CORBY, Aeroplane Rigger (Messrs. Vickers, Ltd., Aviation Department).

The R.A.F. in Mesopotamia and Persia

In the House of Commons recently, Mr. Churchill

gave the following figures regarding the Royal Air Force in the Middle East:—

	Mesopotamia.	N.W. Persia.
On March 28	49 officers	4
	548 other ranks	13
	318 natives	9
On June 14 (latest return)	75 officers	5
	562 other ranks	26
	307 natives	6

These numbers do not include followers.

The Gift to South Africa

THE aircraft presented by the Imperial Government to the Union of South Africa, comprises one hundred and twelve aeroplanes and four airships of which the aggregate value is given as £1,750,000, together with aeroplane material and accessory vehicles.

Italy's Share of German Aircraft

OF the German aircraft to be handed over to the Allies under the Peace Treaty, Italy's share of them are two Zeppelins, 100 aeroplanes, and 300 motors, loaded on 50 wagons, to be delivered by the Germans by the end of July.

The OLYMPIA 1920

AERO SHOW

SOME GENERAL IMPRESSIONS

IN going round the stands at Olympia two things impress one at once: the general excellence of the designs, and the absence of "freaks." Compared with pre-War aero. shows, and after all that is the proper basis of comparison for an aero show which is mainly commercial in character, the quality of the designs, the sound engineering practice embodied in the machines regarded as structures, and the amount of scientific knowledge and research which has been applied in order to make the modern aeroplane what it is, are decades ahead of anything seen at previous aero exhibitions. The absence of freaks is a direct result of the knowledge gained during the War. The laws governing design have been so well established that there is nowadays little room for radical departure as regards general principles. That there is little to be found at Olympia of a startling character is not to be wondered at when it is remembered that the aircraft industry has been thrown, in the space of a few months, so to speak, from a state of feverish activity into one of comparative stagnation which does not permit of ambitious experiments being made with entirely new types designed for commercial work. That in spite of severe handicaps, resulting from the present state of affairs, many excellent machines, expressly designed for commercial flying, are to be found at the show, augurs well for the day when aviation comes into its own and takes, as it most certainly will within the next few years, its place among the recognised means of transport of the world. The present show furnishes an indication that the aircraft industry is ready to, and capable of, producing the right machines as soon as the demand for them arises. That it will arise cannot be doubted for a moment; it is now merely a question of time, and of establishing public confidence in aircraft as a reliable transporter of commercial loads.

In general character the show is decidedly "commercial." That is to say out of the 28 machines there (counting in two which at the time of writing have not yet made an appearance) only three are military types. Of the remaining 25, two are small sporting single-seaters of low power, one is a high-power single-seater, and one a racing machine pure and simple. Of the remaining 21 machines, 13 are provided with enclosed cabin accommodation for the passengers. This shows a decided tendency towards providing maximum comfort for the aerial traveller, and although many of us who have been used to flying in the old open machines may still prefer to feel the draught in our faces, there is no doubt that the air traveller of the future, who travels by air in order to get from place to place in the quickest possible time rather than for the fun of flying, will prefer to be out of the draught and away from the noise of the engine.

The Arrangement of Cabins

That for most of the passenger-carrying commercial machines cabins must be provided may be accepted. There is still, however, some uncertainty as to how, exactly, the cabin accommodation should be arranged. In the case of twin-engined machines the problem is fairly simple. The whole, or nearly so, of the front portion of the fuselage is available for passenger accommodation. In all the three twin (or multi) engined machines exhibited, the passengers' cabin extends from a point near the leading edge of the planes to some distance aft of the trailing edge. The quarters of the pilot are in the nose. The Bristol Pullman triplane has the pilot's cockpit covered in, but in the Handley-Page W8 and in the Vickers-Vimy-Commercial the pilot is in the open.

In the single-engined type of machine, however, the problem is less simple. Two distinct arrangements are possible. The pilot placed ahead of the cabin and seated aft of the cabin, fairly far back in the fuselage. Both arrangements are to be found at the show, with several examples of each. From the pilot's point of view probably the forward position is to be preferred. The view is less restricted than it is when he is placed far aft, with a, usually, wide body and engine housing in front of him. Also he is probably better able to "feel" his machine than when he is far aft. In the latter

position a small movement of the elevator, when about to land, results in the pilot feeling his seat drop a considerable distance, owing to his position so far aft of the centre of gravity. In consequence, until he becomes accustomed to the machine, at any rate, he may think he is too tail-down, and consequently land the machine considerably faster than he intends to do. Against the forward position, between the engine and the cabin, is this to be said that differences in the number or weight of passengers will affect the trim of the machine. It is true that this can be counteracted by a trimming tail, but usually any great variation from the normal of the angle of the tail plane is not conducive to making the machine nice to fly. Also when the pilot is seated close to his engine he is probably more liable to injury in case of a crash. The whole problem is one which time alone can solve, and as in so many other things connected with engineering the final result may quite probably be a compromise. At the show one finds already one such example of compromise in the Westland Limousine, where the pilot sits next to but a little higher than the seat of the aft passenger. The result of this arrangement is a very compact disposition of the "live" load, with the pilot approximately in his normal position, and with the passengers so close together and near the c.g. that differences in weight or number of passengers will have no undue effect on the trim of the machine.

The Matter of Engines

A perusal of the double-page table and silhouettes of the machines, published in our issue of last week, shows that of the 28 machines, two only are fitted with rotary engines. This is rather significant, and would seem to indicate that in spite of its light weight the rotary is not considered the most suitable type for commercial work. Whether this view is only temporary, or whether it indicates the final exit of the rotary for civil aviation yet remains to be seen. It can scarcely be denied that the rotary is a delicate piece of mechanism, requiring a lot of looking after if it is to run well and reliably.

Guarding Against Fire

One of the serious risks of flying, and certainly one of the most terrifying to pilot as well as passengers, is that of fire on board. If full data regarding machines catching fire were available it would be found that the percentage of machines burnt is very small. It is, however, a risk which has to be considered, and which must be guarded against at all costs. The show at Olympia indicates that manufacturers are beginning to be fully alive to this fact, and are taking the necessary precautions. In the first place fireproof tanks are beginning to be the order of the day. The fitting of these is mainly a safeguard against fire following a crash. To prevent the possibility of a machine catching fire while in the air such precautions as gauzes in the induction pipes and fireproof bulkheads between the engine housing and the rest of the fuselage are becoming increasingly evident. By these means the risk of fire is practically reduced to vanishing point, and when the time comes, as it certainly must some day, when machines are built entirely of metal, the last possibility of danger from this source will have been, to all intents and purposes, precluded.

Metal versus Wood and Fabric

Although one finds in several of the machines exhibited metal construction employed to a greater or less extent, there can be no doubt that by far the greater majority of the machines are built, as regards use of materials, on the same principles as have been in use for years. While this can be readily understood—the "old-type" construction is certainly simpler where small quantities are concerned—it is nevertheless to be regretted. It is scarcely to be disputed that metal construction will come—must come; and it would appear that manufacturers are—as it was put to us by the chief engineer of a firm which has done a very great amount of experimenting with metal construction—merely

putting-off the evil day. It is not an easy matter to turn out a satisfactory all-metal machine, but the problem will have to be tackled sooner or later, and the sooner a firm begins to tackle it the sooner, obviously, will it pass through the difficult initial stages which always attend attempts at breaking new ground and arrive at the metal machine which is a commercial proposition. In the way of actual all-metal machines there is one machine, and one only, at the show. This is the Short, which is of metal throughout, even to the wing covering. This is the first time in the history of aviation that a British machine entirely without wood or fabric in its construction has been exhibited, and Messrs. Short Brothers are to be congratulated, not only on a very fine piece of work, but also on having had the courage and foresight to launch out along entirely original constructional lines. Whether the machine as it actually stands yet represents a commercial proposition, or whether it should merely be regarded as a step on the way to finality in design, does not detract in the slightest from the merits of the task tackled, and we can only express the hope that the lead given by this firm will be followed by many others, so that at the next Olympia show there will be a great number of all-metal aeroplanes. The task is a difficult one, but it is one which can only be put off for a time.

The Question of Unit Construction

The time was when a machine was so designed that all its parts were so interconnected that if one part failed nearly all the rest of the machine collapsed. We have distinct recollections of one particular machine which on a certain occasion broke a chassis strut after taxiing across the aerodrome. For several minutes afterward sounds continued to issue from various portions of the machine. Ping went a wire, crack—Crack said the struts, Pong went another wire, and so until the machine gradually settled in a heap on the ground. The days when this happened are over long ago, and designers now aim at making the various units of a machine as self-contained as possible, so that damage to one part does not affect the rest of the machine. In several of the machines shown one finds, for example, the fuselage built in three sections, the front one being formed by the engine housing, the middle one by the passenger cabin, and the aft portion by the tail end of the fuselage. Thus in case of damage to one of the sections the whole body need not be scrapped or re-built. A new section is put in in place of the damaged one, and the machine is ready again. While this is a healthy sign, we do think that it could and should be carried much farther. Thus we were informed on the stand of one firm that it only took 24 hours to change the engine. We submit that if the engine with its housing had been designed as an independent unit, the change of engine should not have taken 24 hours, but more likely 24 minutes. It should not be very difficult so to design the nose of a machine that the whole engine housing with engine complete came adrift after undoing some 6 or 8 bolts. There is no doubt that on a commercial air service engine trouble is the most frequent cause of a machine being laid up. If the machines are so designed that the engine can be changed in a very short time, the faulty engine can be replaced and taken to the engine-

shop, where the necessary repairs can be effected under the most favourable conditions.

In twin-engined machines the problem is complicated by the fact that the engine struts are also interplane struts. It should, however, be possible so to design the arrangement of the engine struts and engine bearers that, when the wings are folded, the engine unit can be slipped out sideways after undoing a few bolts and turnbuckles. A travelling crane would then be used for removing one engine unit and substituting another.

On Economy of Flight

A study of the table which we published last week discloses the fact that the average loading per horse-power is gradually growing. This is, we think, a healthy sign. For War purposes it was performance which counted, and the price at which this performance was bought was, comparatively speaking, immaterial. The call for performance led to lighter and lighter engine loading until 10 lbs./h.p. was considered a fairly heavy loading. The resulting speed and climb improved out of all recognition, but the load which could be carried was small, and the duration of the flight was but short. Now, for commercial work performance is not of such vital importance—except in some relatively few instances. What is of great importance, however, is the economy of flight. Power loadings of 10 lbs./h.p. may result in spectacular performances, but they are not a commercial proposition. The value of the saving in time between a machine doing 150 m.p.h., and carrying a load of only between 6 and 7 lbs./h.p. and one which does, say, 100 m.p.h., but carries close on 20 lbs./h.p., is not sufficient to make the extra speed worth the cost.

Except, as we have already said, in a few isolated cases. Our table shows that quite a good proportion of the machines exhibited carry loadings of round about 20 lbs./h.p., and having maximum speeds of in the neighbourhood of 100 m.p.h. Compared with the speeds of some of the later War machines this is a crawl, we admit, but then they should not be compared with these weapons of War any more than a barge should be compared with a destroyer, or a submarine chaser. A much sounder basis for comparison with the commercial aeroplane is the train, the steamer, and the motor-vehicle. Compared with any of these an aeroplane which is capable of 100 m.p.h., or a cruising speed of 80-85 m.p.h., is fast—very fast. So much faster than the others that the slight extra cost of this form of transport is worth while.

The "Popular" Aeroplane

Even at the present day there are those who refuse to see any future for the little low-powered single-seater sporting machine. It is, they say, a toy of no practical value. This contention has been refuted in the best possible manner by Mr. Bert Hinkler's recent non-stop flight from London to Turin, a distance of close on 700 miles, accomplished for a fuel expenditure of 20 gallons of petrol. As a matter of fact the 35 h.p. of the Avro "Baby" and 45 h.p. of the Austin "Whippet" (both exhibited) does not represent the minimum with which it is possible to fly, but merely the minimum power of engine which is at present obtainable. Another firm has just announced its intention of putting on the market a machine with 45 h.p. engine, to be sold at £250.



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THE AUSTIN "WHIPPET" AT OLYMPIA: This little machine has folding wings and occupies a very small space

SOME CONSTRUCTIONAL DETAILS

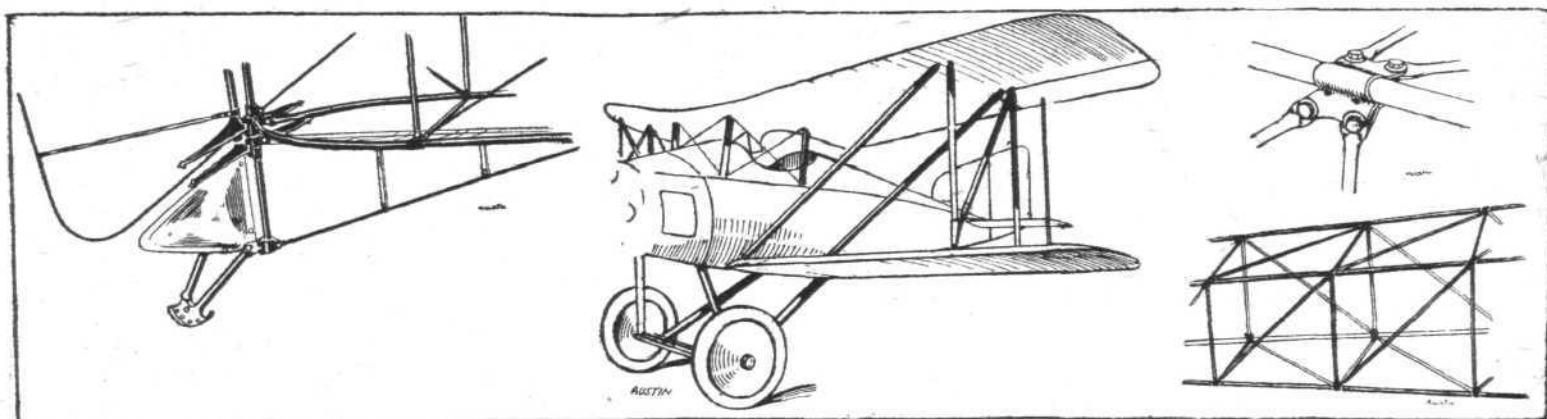
In our issue of last week we dealt with all the machines exhibited at the Olympia Show, giving a table of characteristics and performances as well as a brief general description of each machine. In the following notes we have attempted to point out little refinements in design and clever constructional details for which we had not the space last week.

The Austin "Whippet"

On the Austin stand one sees examples of the one-man sporting type machine, in the design of which simplicity and ease of upkeep have been first considerations. It is quite certain that the "owner pilot" will not wish to be bothered with constantly having to make adjustments to his machine,

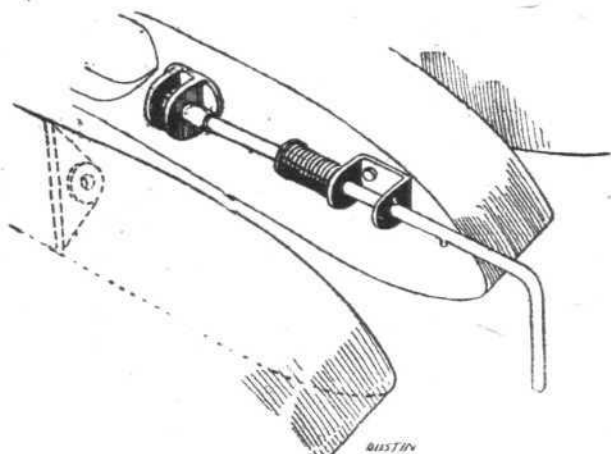
such as stripping the covering off his *fuselage* to tighten up wires after a rough landing, or to be constantly going over his wings with plumb line, spirit level and incidence gauge. In the Austin "Whippet" a serious attempt has been made to obviate the necessity of these adjustments by so designing the machine that once erected and trued up, it is not likely to require much in the way of adjustment afterward, certainly not until after considerable use.

The manner in which this is brought about is, as regards the *fuselage*, to do away with all diagonal wire bracing. The four *longerons* are thin steel tubes, as are also the vertical and horizontal struts. The structure is kept in proper alignment



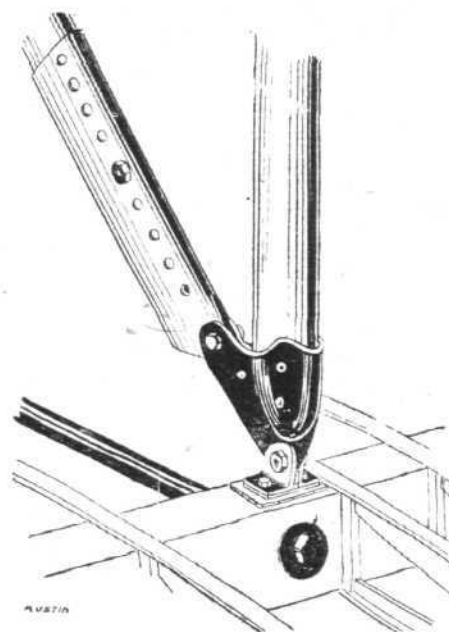
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SOME DETAILS OF THE AUSTIN "WHIPPET." On the left is shown the sprung tailskid, and on the right the body construction. The diagram in the centre shows the wing bracing



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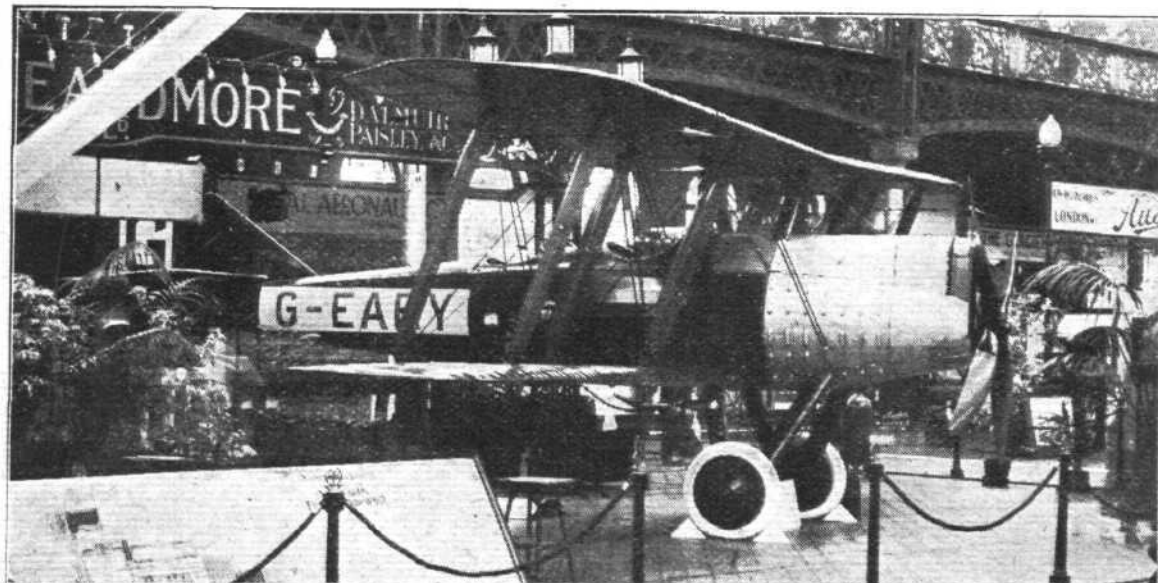
THE AUSTIN "WHIPPET": Sketch showing the locking device for the folding wings

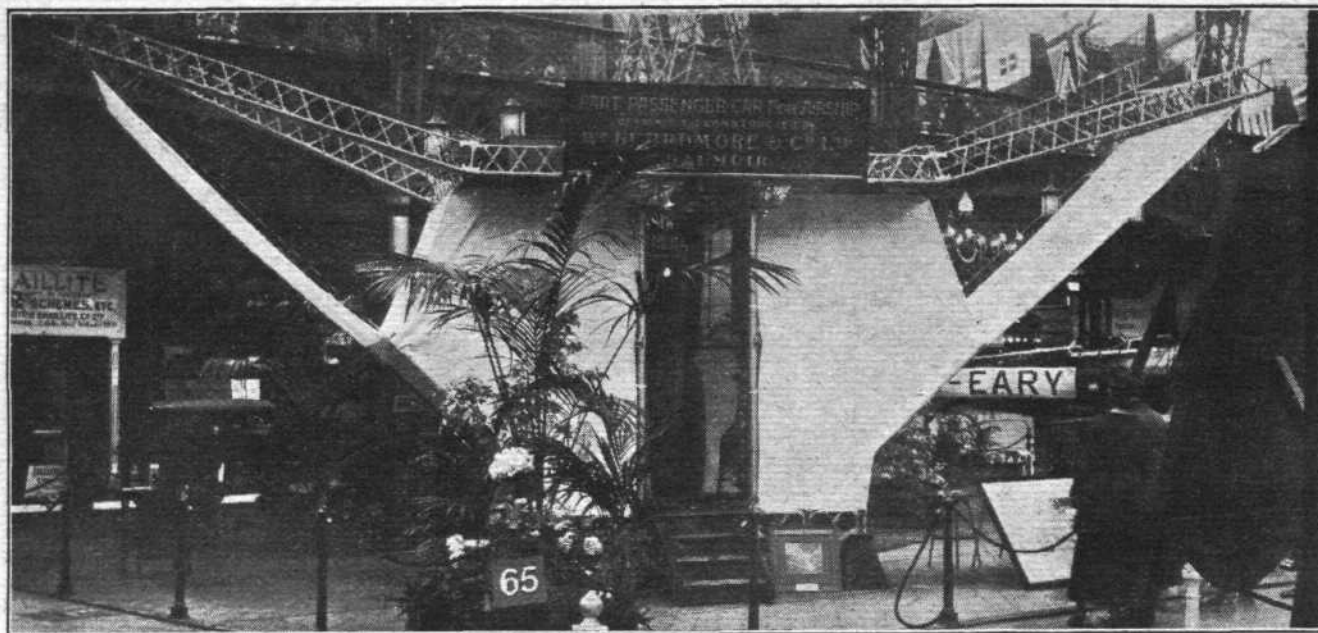


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The adjustment of the incidence tube on the Austin "Whippet" is by means of a series of holes

■ ■ ■ ■ ■ ■ ■ ■
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 ■ "Flight" Copyright
 ■ The Beardmore
 ■ W.B.II at Olym-
 ■ pia. A second
 ■ machine, the
 ■ W.B. X, unfor-
 ■ tunately, failed
 ■ to put in an
 ■ appearance
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 ■ ■ ■ ■ ■ ■ ■ ■





"Flight" Copyright.

ON THE BEARDMORE STAND AT OLYMPIA : View of a portion of an airship passenger cabin

by diagonal steel tubes attached to clips on the *longerons*, and made to exact length in the first place, so that once bolted up no further adjustment is necessary.

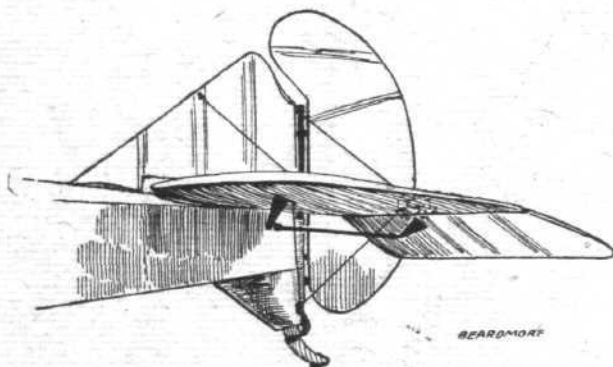
A similar method has been employed in the wing bracing. Instead of the ordinary lift and landing wires, two long tubes

A point which attracts special attention in this little machine is the fact that in spite of its small size, it is fitted with folding wings, a fact which should go a long way towards popularising the Austin "Whippet," seeing that, when folded, it occupies little more space than an ordinary motor-car. As the engine is of low horse-power—45-50 Anzani—the fuel consumption is low, and the running costs should be relatively small.

Wm. Beardmore and Co., Ltd.

One of the machines which was to have been exhibited on the stand of this firm, the W.B. X, had not put in an appearance at the time of going to press, and we are informed that it will probably not be shown. The second machine, the W.B. II, is similar to the W.B. II fighting, reconnaissance and long-distance patrol machine used in the R.A.F. Its girder type body is carefully streamlined into a circular cross section. The narrow engine cowl which is possible with the Beardmore engine gives the pilot an exceptionally good view, and altogether the machine has a very neat, clean appearance. As the machine is practically a standard type, there were few unusual features to be found on it. One, which is shown in one of our sketches, is the unusual arrangement of the elevator cranks and control. The transverse tube which forms the pivot for the trimming tail plane carries on each side a crank from which tubes are taken to corresponding cranks on the elevator. In this manner the slackening and/or tightening up of the elevator cables when the tail plane is trimmed are avoided.

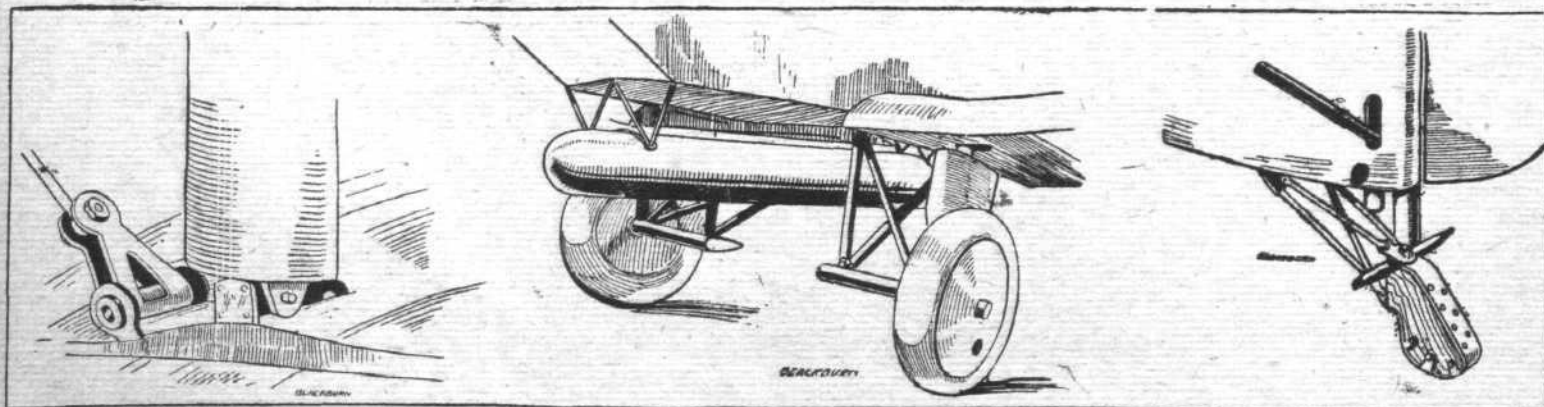
Apart from the W.B. II, a number of other exhibits attract attention on this stand. Thus there is a portion of the passengers' cabin of an airship, fitted up with chairs, tables, berths, etc., showing how, in point of roominess, the airship scores over the aeroplane. A large coloured drawing of the hull of an amphibious flying boat, with the engines in the hull, gives one a peep into the future, while sundry Beardmore engines give evidence of this side of the firm's activities.



"Flight" Copyright

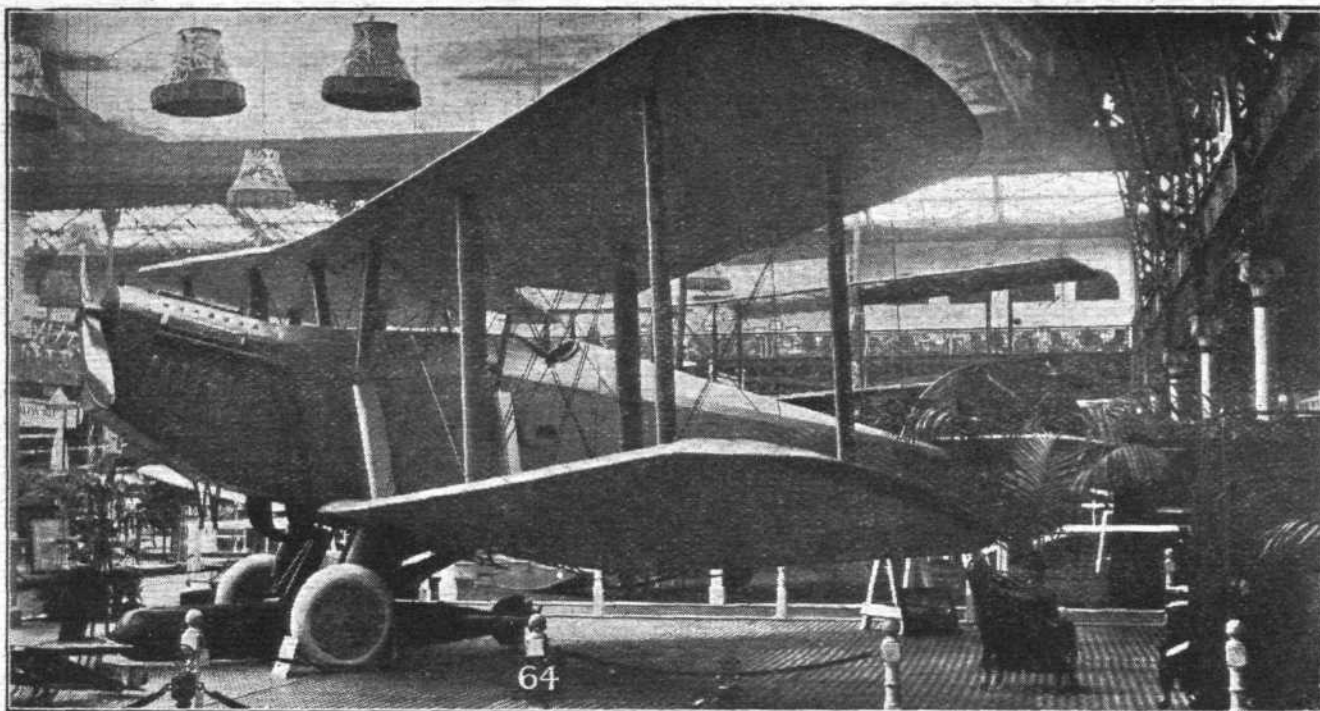
THE BEARDMORE W.B. II : The sketch shows the unusual elevator crank lever arrangement and the tail skid

slope outward from the lower wing root to the top of the interplane struts. When the machine is in the air, these tubes are, of course, in tension, while when the machine is upside down or resting on the ground they are in compression. It is not anticipated that any adjustments will have to be made for long periods, but should this be necessary provision has been made, by a series of holes in the tubes and their sockets, to make easily and quickly any adjustment that might be required. Some of our sketches will help to explain the detail design.



SOME DETAILS OF THE BLACKBURN "SWIFT" : On the left the interplane strut attachment. In the centre the undercarriage, and on the right the tail skid

"Flight" Copyright



AT OLYMPIA : The Blackburn "Swift" is a torpedo-carrying machine designed for starting from and alighting on the platform of a ship "Flight" Copyright.

It is to be regretted that the W.B. X did not get to the show, as this machine incorporates several novel and interesting features. As, however, the machine will be entered for the Government Competition at Martlesham more will be heard of it shortly.

The Blackburn "Swift"

As pointed out in our issue of last week, the Blackburn "Swift" has been designed to an Air Ministry specification, and consequently many of the most interesting points in the design cannot be referred to in detail. This applies particularly to the torpedo gear and its various accessories. The "Swift" is designed to start from and alight on the platform of a warship and carries a standard torpedo. As exhibited this torpedo is not shown in place, as some of the gear for slinging and dropping it, etc., is of such a nature that the authorities do not wish details published.

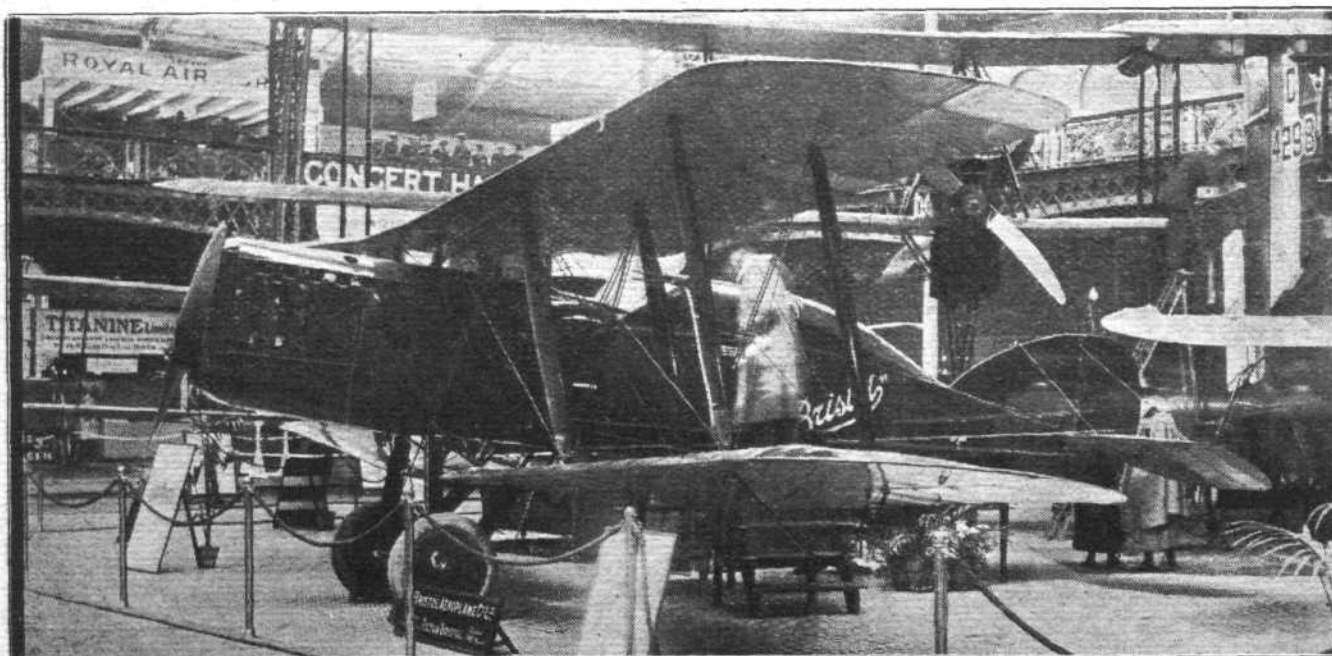
One special feature of the machine is the construction of the central unit, comprising the middle portion of the fuselage. The under-carriage, the top centre section, and lower wing roots, etc., are all built up in one unit of strong steel tubing. The machine, as already mentioned, is designed to alight on a ship's platform, but for cases where this is not possible, a

special arrangement (not shown) is provided whereby the wheels can be dropped before the machine touches the sea, as the presence of the wheels in place would have a tendency to cause the machine to nose over on striking the water.

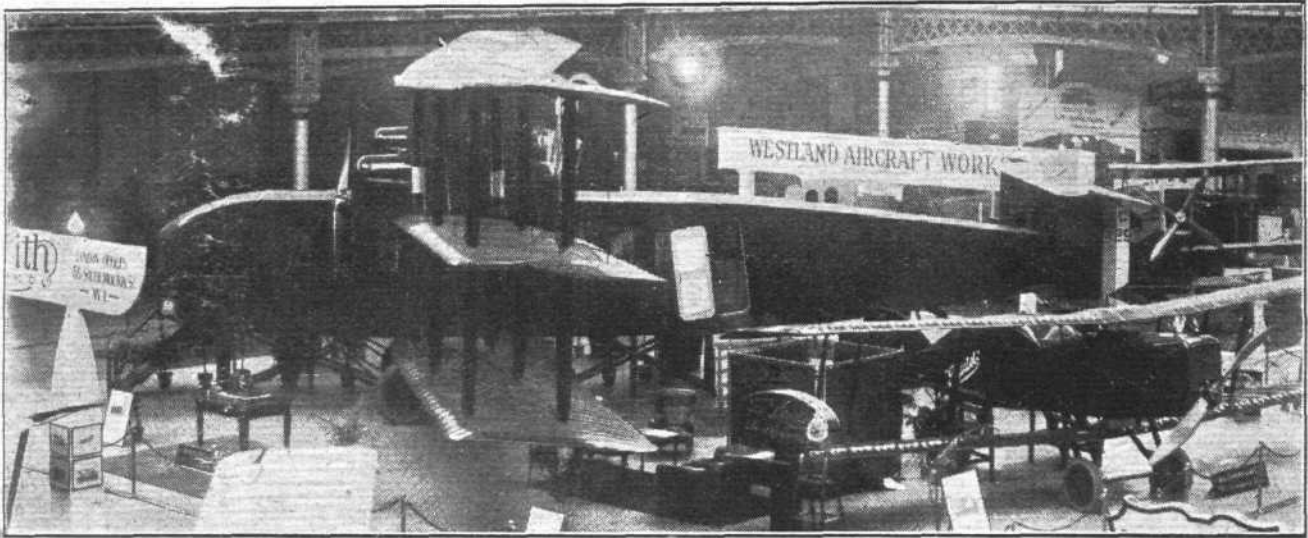
For use on ship-board it is essential that the machine should stow into as small a space as possible, and this is accomplished by arranging the wings to fold back as in the ordinary vertical biplane. The fact that the Blackburn "Swift" has staggered planes has rendered the problem of folding more difficult, but it would appear to have been solved in a very efficient manner, and the only difference in actual use is that as the pivoting points of upper and lower rear spars are not vertically above one another the wing tips point upward slightly when the wings are folded back. Slings are provided for hoisting the machine, and this can be accomplished either with the wings folded or spread, the only effect of hoisting the machine with folded wings being to cause it to be slightly down by the tail.

Some Bristol Features

As the largest machine in the Show, a good deal of attention naturally falls to the huge Bristol Pullman triplane with its luxurious cabin, which is more reminiscent of a railway



THE BRISTOL COUPÉ TOURER AT OLYMPIA : This machine carries two passengers in addition to the pilot "Flight" Copyright.

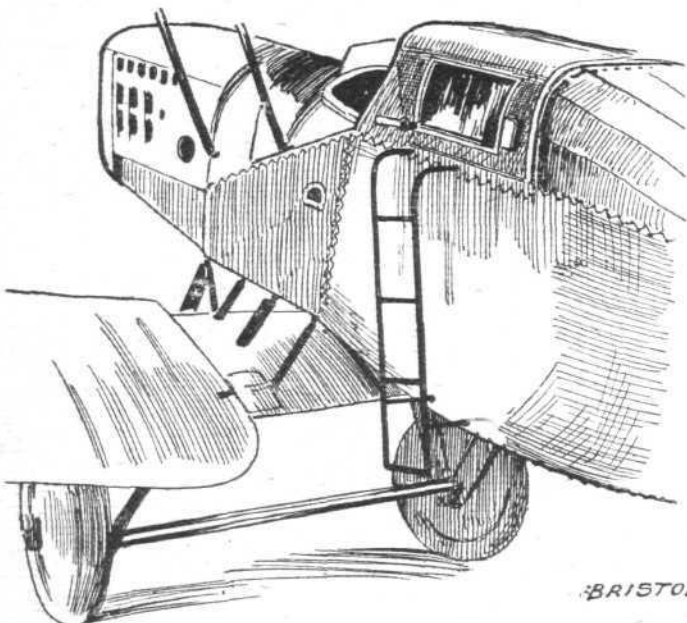


A GIANT AT OLYMPIA : The Bristol Pullman triplane with four engines. In spite of its size the Pullman has an extraordinary turn of speed¹

carriage than of a structure to be taken into the air. The cabin is divided into two halves by compartments for the main petrol tanks. There is, however, a narrow passage

particular feature of the design which is considerably out of the ordinary. This is the four-wheeled Oleo under-carriage, necessitated by the great weight of the machine. There are two wheels in tandem on each side, supported on Vees whose limbs run respectively to the lower longerons of the fuselage and to the point corresponding to the attachment of the engine struts. The rear wheel takes most of the load when on the ground and the main function of the front wheels is to prevent the machine nosing over on landing. The movement of the wheels is rather peculiar, being a form of link motion, as the wheels, owing to the radius rods having a downward slope, have a slight fore and aft movement in addition to the vertical travel. The arrangement of the under-carriage will be better understood by a reference to one of our sketches.

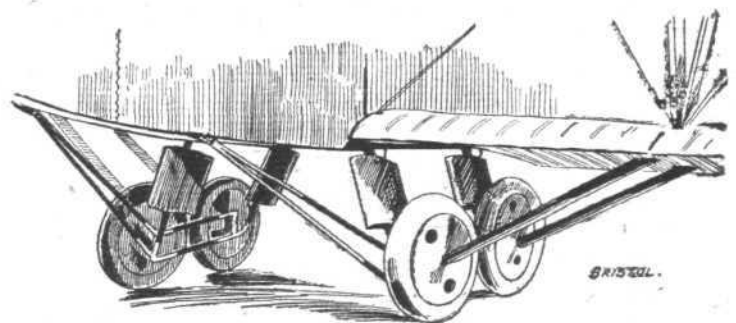
In connection with this four-engined giant, it is of interest



THE BRISTOL COUPÉ : The body is swelled out in the vicinity of the cabin to give more "elbow room"

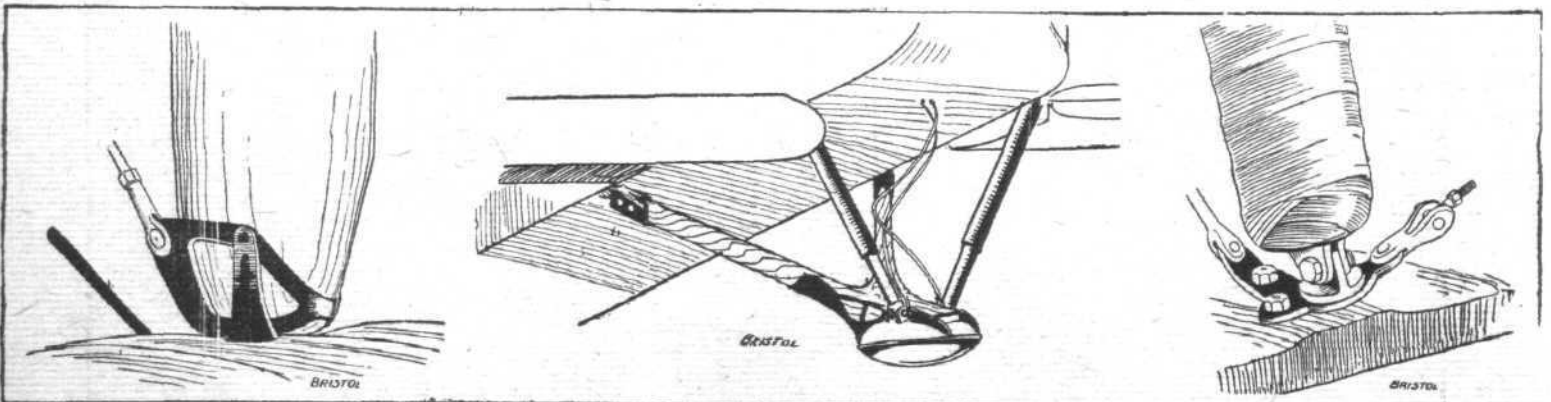
between the two cabins, so that passengers can walk from one cabin to the other during flight.

A general description of the Bristol Pullman has already been given, and it will therefore suffice here to refer to one

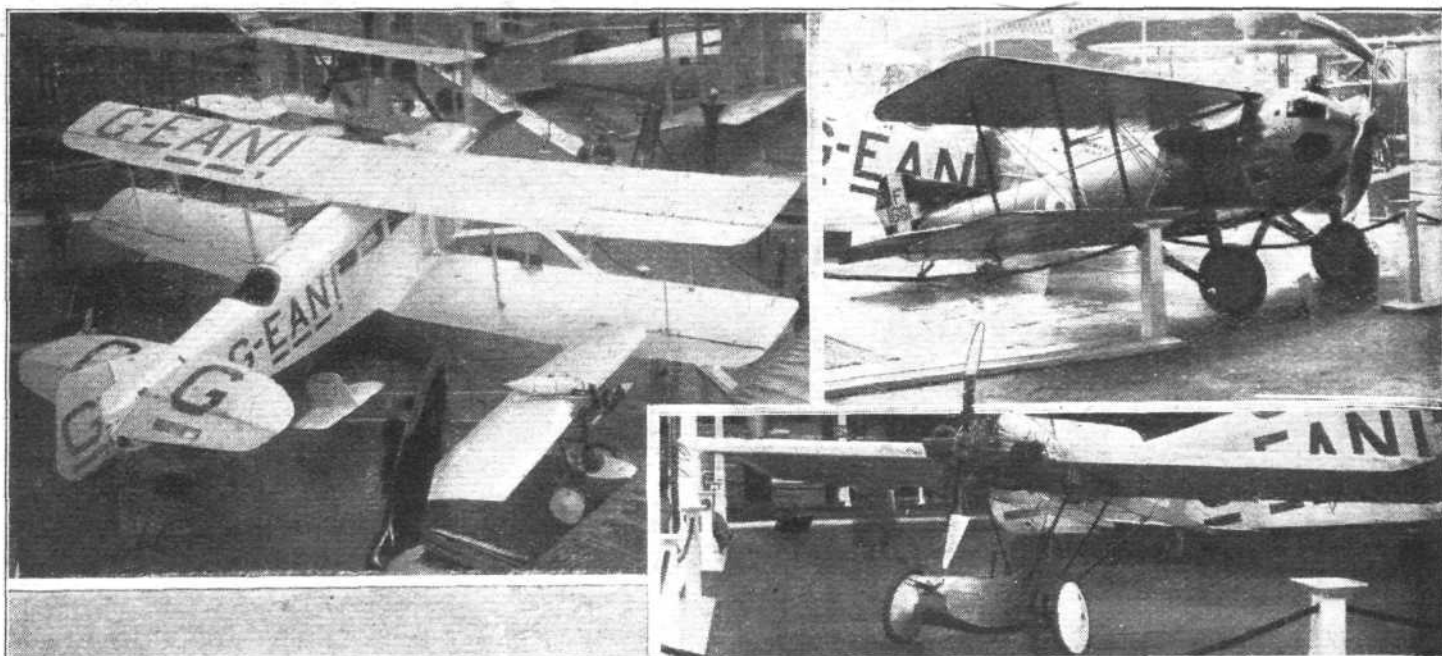


The under-carriage of the Bristol Pullman

to note that on more than one occasion the machine has taken off on two engines only, with full load on board. There is, therefore, little risk of the machine having to make a forced landing through engine failure, a point which is greatly



SOME BRISTOL FITTINGS : The sketches on the left and right show respectively the strut attachments on the Pullman and on the Coupé Tourer. In the centre is seen the tail skid of the Pullman



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BATS AT OLYMPIA : On the left the Commercial Mark I. On the right the Bantam, and in the centre the "Crow"

in its favour for commercial work. Otherwise perhaps the time is scarcely ripe yet for a passenger carrier of this size, since she can hardly be a commercial proposition unless the full complement of passengers is carried every time. By way of showing what can and will be done, however, the machine is an excellent example of what we may look forward to some day, and needless to say the workmanship is of the quality which has made the Bristol firm famous.

A much more immediately practical proposition is the Bristol Coupé Tourer, which is listed at £1,400. The Bristol Fighter, from which the Tourer was evolved, was always one of the best liked in the Air Force during the War, for sheer nicety of handling and stability. These features have been retained in the Coupé, and at the low selling price referred to there is little doubt the machine will become as popular for commercial work as the Fighter was for War purposes.

The manner in which the Fighter has been adapted as a three-seater commercial machine is very ingenious. The front portion of the fuselage, up to a point behind the pilot's seat, is that of the standard body. Aft of this point, however, a new tail portion has been fitted, curving outwards slightly to give more elbow room in the passenger's cabin. It might be expected that the "bulge" thus caused would have an adverse effect on the performance of the machine. In practice,

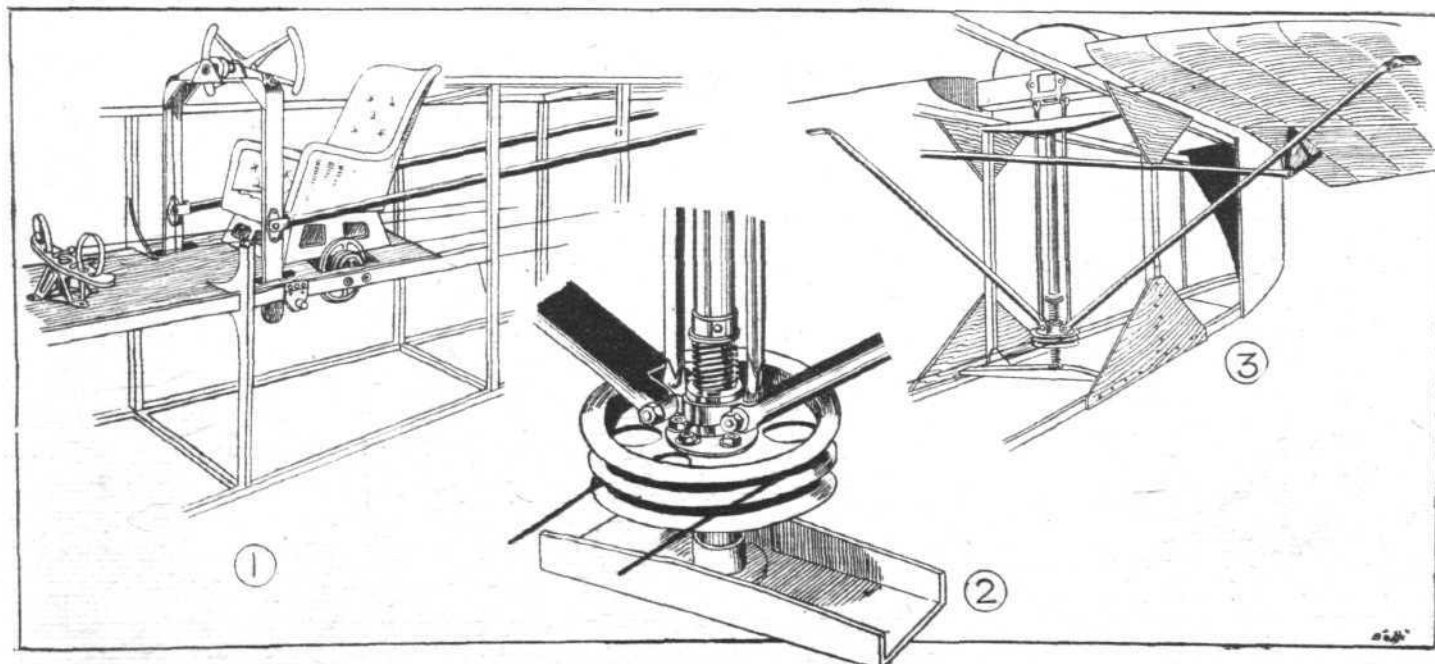
however, this has not been found to be the case, and on the contrary, if there is any difference in the speed it is rather in favour of the Coupé. We would not suggest that this improvement is caused by the "bulge," but rather by the fact that the heads of the passengers are enclosed and streamlined off. In other respects the Coupé Tourer is a standard Fighter which is already so well known, well tried, and well liked, as to need no further reference here.

The Bats

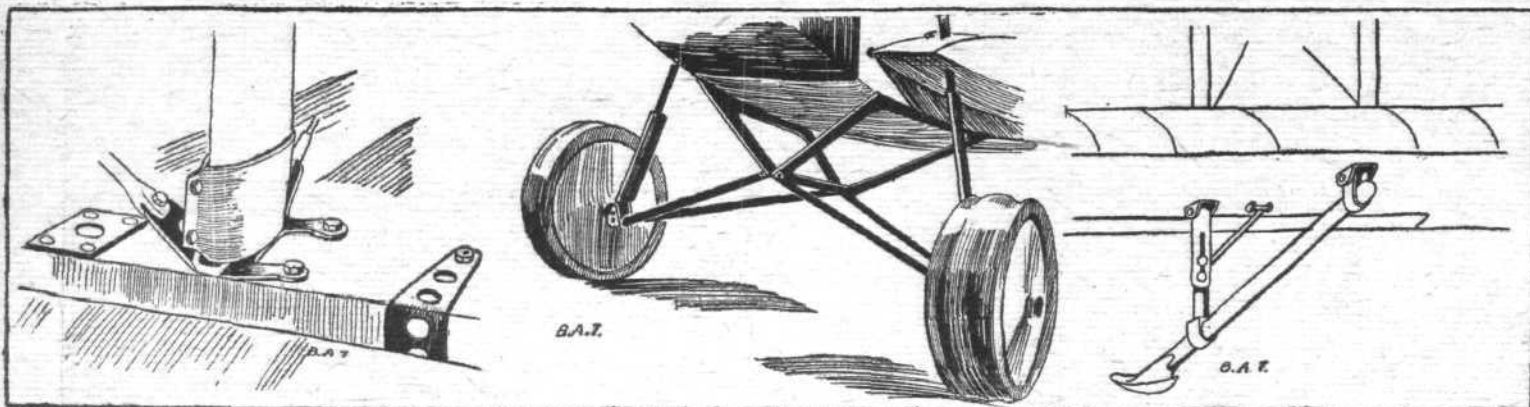
On the stand of the British Aerial Transport Co., Ltd., the three machines shown are already well known to readers of *FLIGHT*, having been fully described in this journal several months ago. We might point out, however, that the B.A.T. Commercial (F.K.26) was the first machine especially designed for commercial work to make its appearance in this country after the Armistice.

The Bantam is a very fine little single-seater with an extraordinarily good performance. Fitted with a Mark II A.B.C. Wasp engine of 200 h.p., she has a speed of 146 m.p.h. at 10,000 ft., while she climbs to 17,000 ft., 16 mins. 18 secs.

At the last moment before the opening of the show it was decided to exhibit one of the little B.A.T. "Crow" type cantilever wing monoplanes, similar to the machine shown at Amsterdam.



THE B.A.T. FOUR-SEATER COMMERCIAL AT OLYMPIA : 1, Sketch of the pilot's seat and control. 2, Detail of the trimming gear. 3, Diagram of the tail plane trimming gear



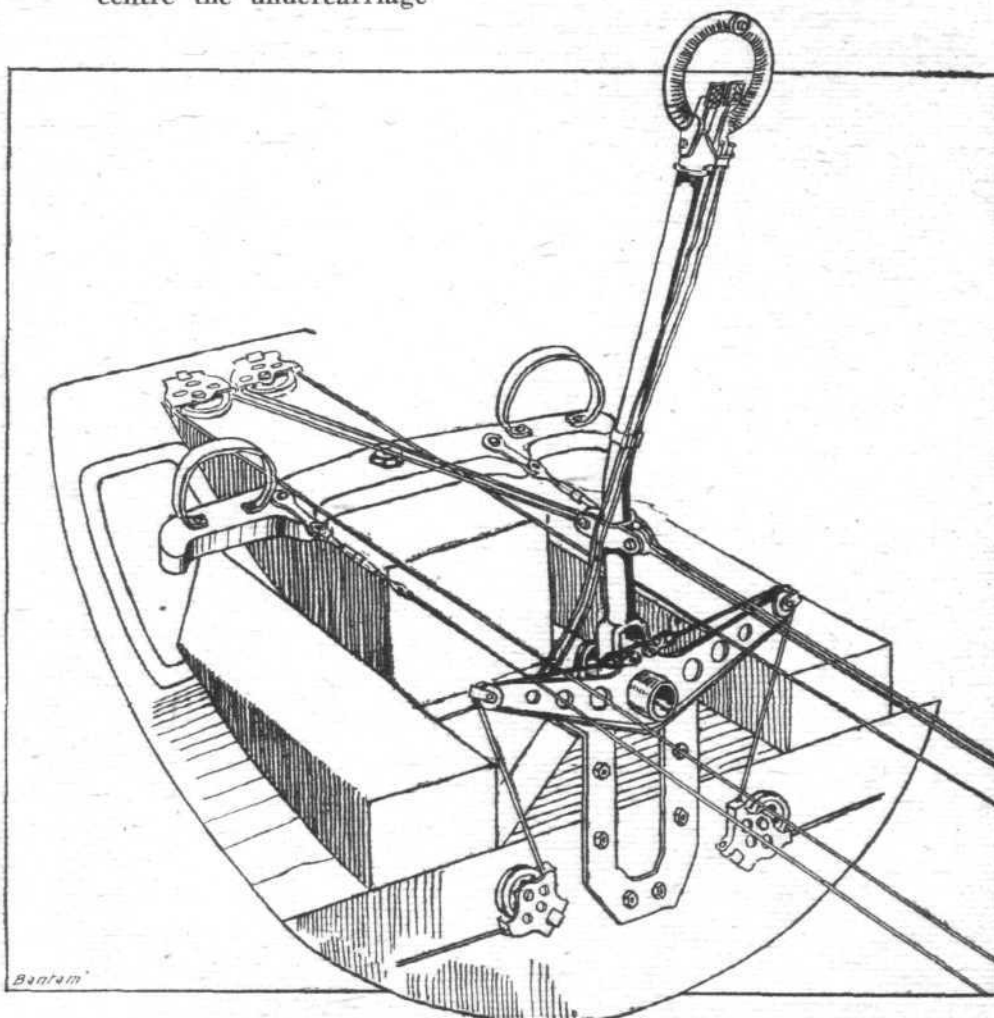
ON THE B.A.T. COMMERCIAL : Left, the interplane strut attachment; right, the wing tip skid, and in the centre the undercarriage

Owing to its small size the "Crow" attracts a good deal of attention, especially from the fair sex, and from the younger visitors of the "superior" sex. As a serious attempt at a sporting machine one could find fault with many of the features of the design, and the type is not likely to be perpetuated. The machine is too tricky to handle, and its gliding angle is—well, we have seen better.

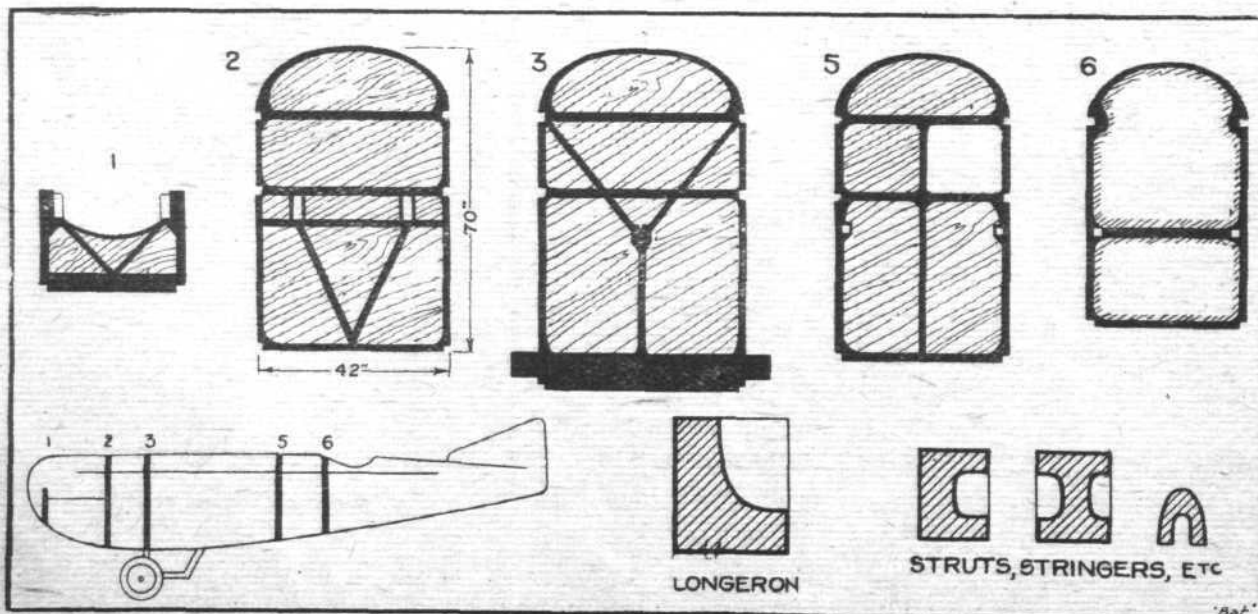
The C.A.C. "Centaur 4B"

A commonsense, straightforward job, is the main impression of the little seaplane exhibited by the Central Aircraft Co. The machine is absolutely devoid of gadgets or fancy work of any kind. It is designed for service and efficiency. That the machine is efficient is proved by the fact that with an engine of 100 h.p. only, she gets off the sea with pilot and two passengers. All three occupants are seated one behind the other in an open cockpit, the pilot in front. In front of the rudder bar is a cranking handle by means of which the 100 Anzani engine can be started by the pilot himself, without the necessity of a mechanic getting out on the float to swing the propeller. Turning the handle operates the starting magneto and turns the engine over, sending the current from the starting magneto through the ordinary magneto, thus ensuring a very hot spark.

The floats are of ample size, in fact, one's first impression

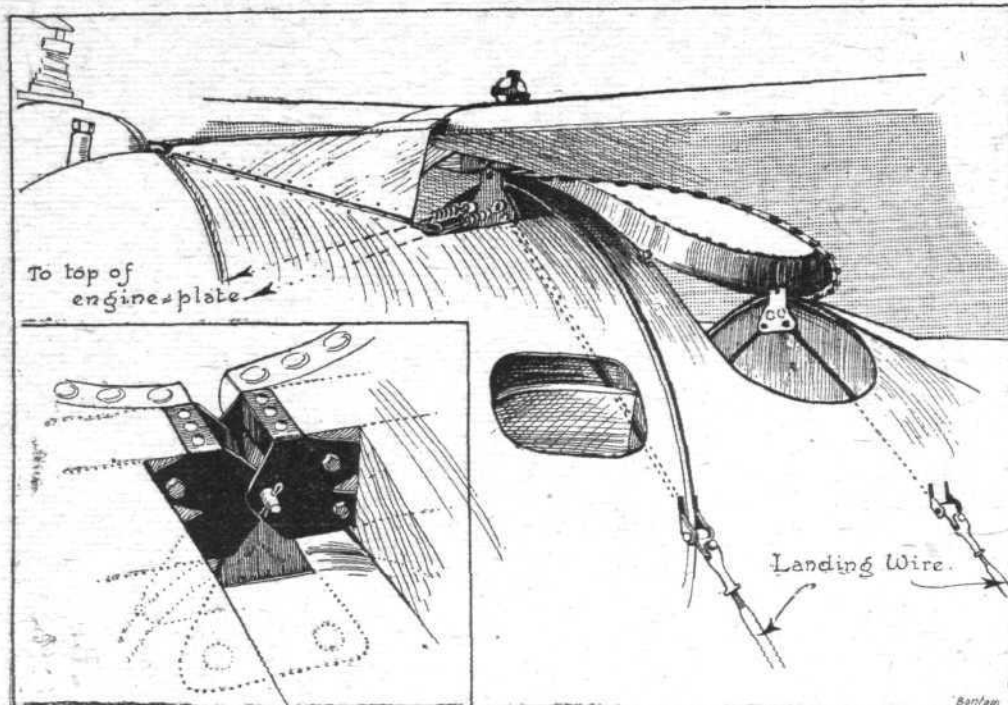


The B.A.T. Bantam at Olympia : Sketch of the controls

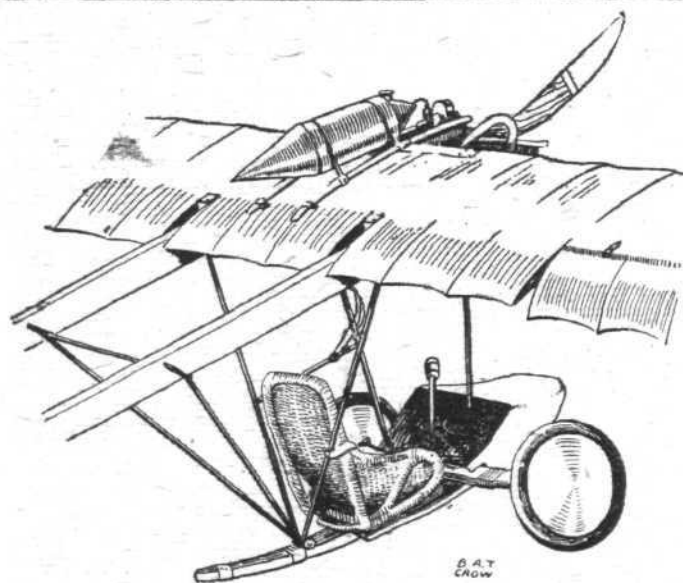


THE B.A.T. COMMERCIAL AT OLYMPIA : Diagram showing the arrangement of the formers in the fuselage

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The B.A.T. Bantam at Olympia: The landing wires of the inner bay are attached to the lugs on the side of the fuselage, from which point steel straps run to the top of the bulkhead, connecting the external landing wires to the top spar attachment. Inset is indicated the manner of attaching the top spars to the top of the bulkhead



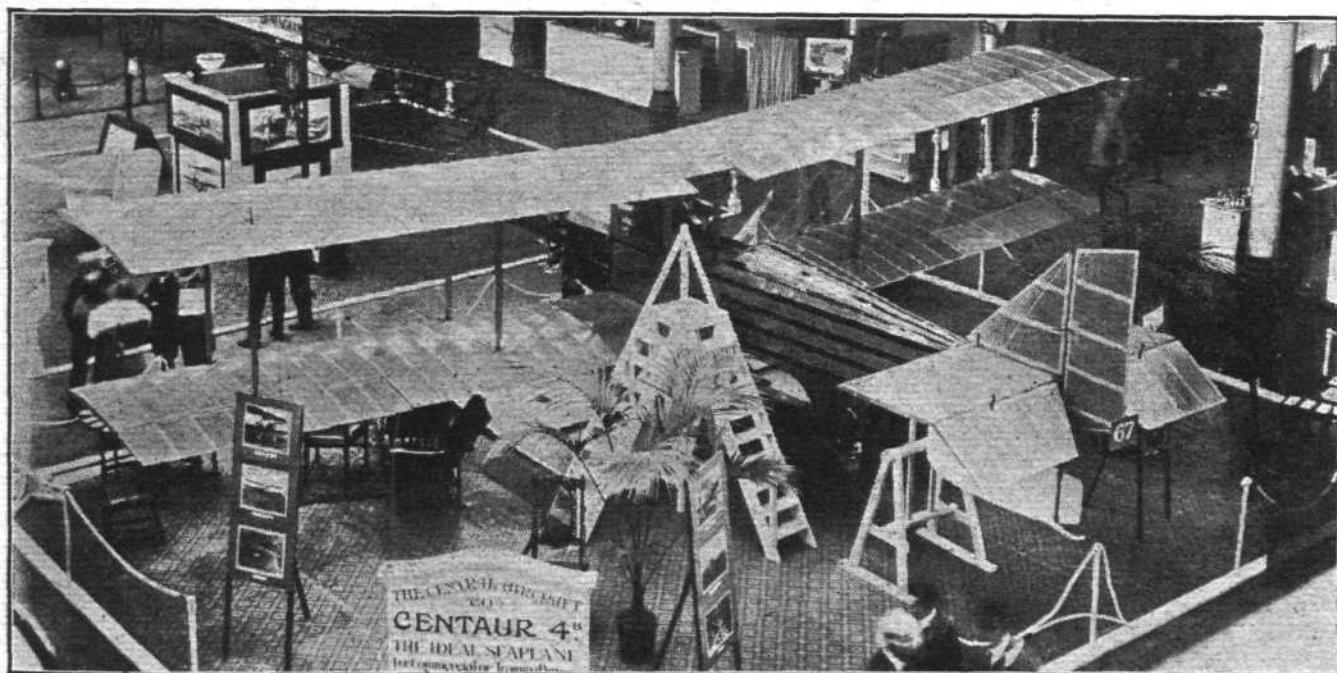
"Flight" Copyright

Three-quarter rear view of the B.A.T. "Crow"

is that they are needlessly large. In practice, however, they have proved just about right, neither beginning to plane too soon, nor refusing to come "unstuck," when the machine has attained sufficient speed for the wings to lift. In shape, the floats are of a flat-bottomed type without any step. In front they are very shallow, and their greatest depth occurs at the rear.

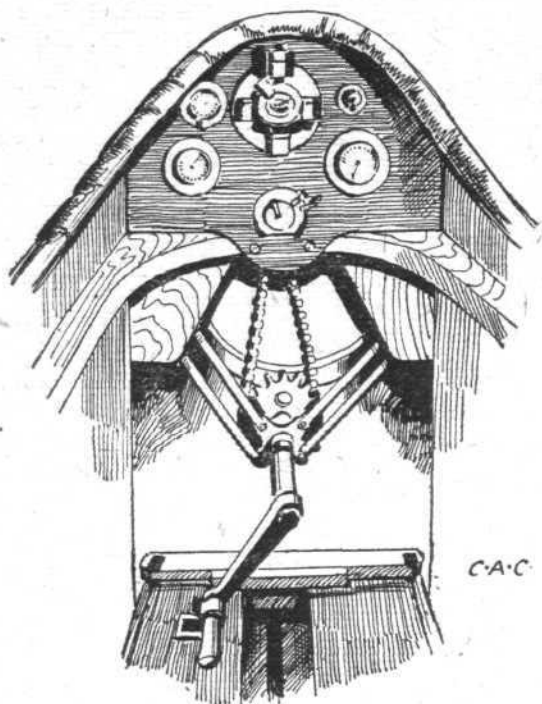
One is almost tempted to describe them as being old-fashioned, seeing that this shape of float was used extensively on some of the early Farman and other seaplanes. This is not, however, meant as a criticism of the floats. On the contrary, on lightly loaded machines like the "Centaur 4B" this form of float is probably as good as any for all-round efficiency. The tail is supported by a small tail float, V-bottomed, and there is a water rudder for steering the machine at low speeds. The fitting of this water rudder is the feature we like least in the design, since, as will be seen from our sketch, if the tail float itself is by the force of the sea, or from some other cause, pulled slightly out of its normal position, this would cause the rudder hinges to stick, and this might prevent the air rudder from operating. However this is a small point which can easily be remedied in practice it should be found necessary to do so.

The painting of the body is unusual, there being a series of

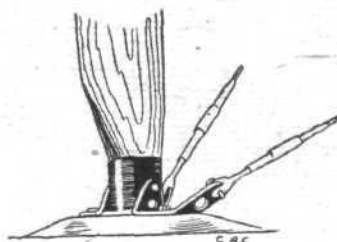


THE C.A.C. CENTAUR 4B AT OLYMPIA: With an engine of 100 h.p. only this machine gets off the sea very well with three people up

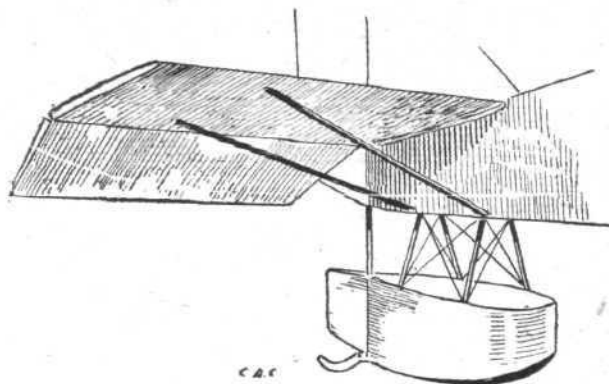
"Flight" Copyright



"Flight" Copyright
The Anzani engine on the C.A.C. Centaur 4B is provided with a starting handle



"Flight" Copyright
Strut attachment on the Centaur 4B



"Flight" Copyright
The tail float on the Centaur 4B is mounted on 4 tubes

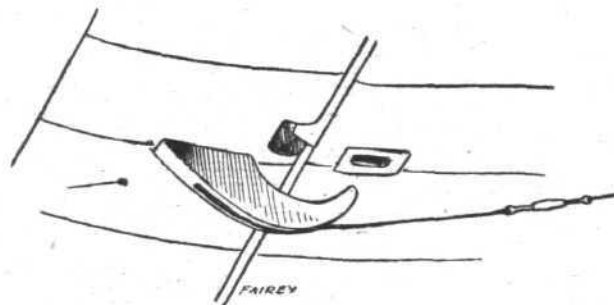
horizontal black and green stripes, picked out in white. The effect of this is to make the body look longer and more slender than it really is, thus much improving the appearance of the machine.

With regard to detail construction, there is little to be said about the machine. Everything is simple and straightforward, designed for quick and cheap production.

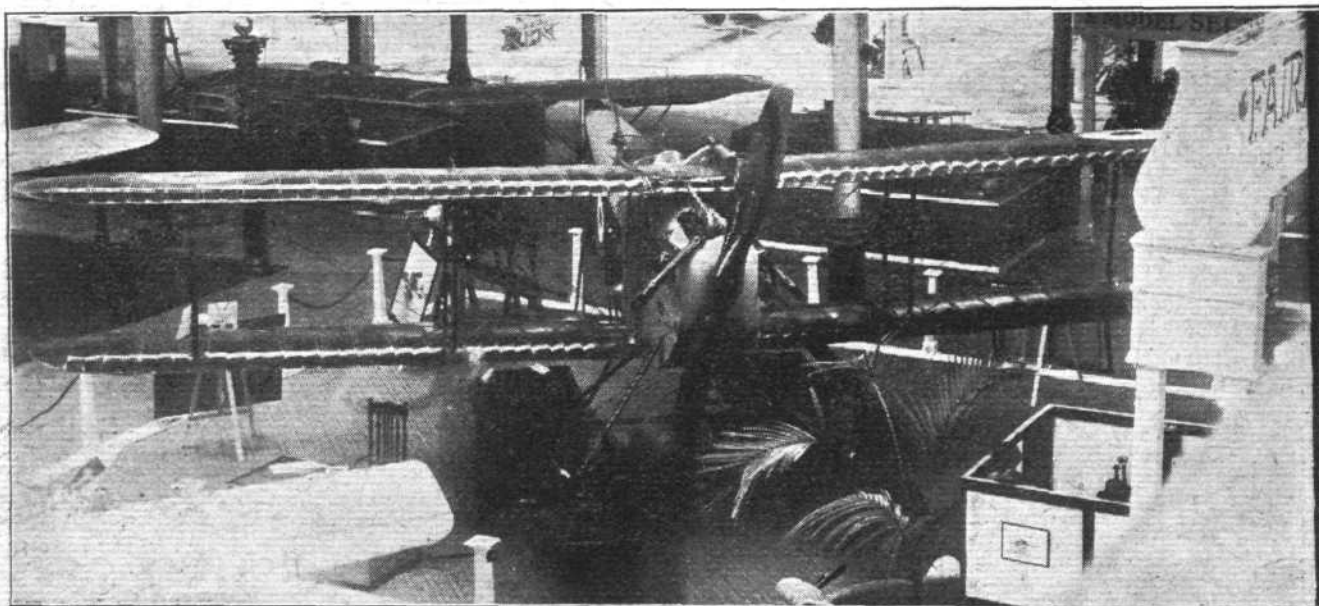
The Fairey XXI

The two main points of interest in the Fairey seaplane are the unit type of construction and the variable camber wings. The engine and its mounting and housing form one unit. The cockpits, the top plane centre section, main float struts, etc., the second unit, and the rear portion of the tail the third unit.

The second feature is the variable camber, which forms a Fairey patent. The variation of camber and, incidentally, of incidence, is effected in the Fairey by having the



"Flight" Copyright.
One of the crank levers by which the camber is altered on the Fairey seaplane

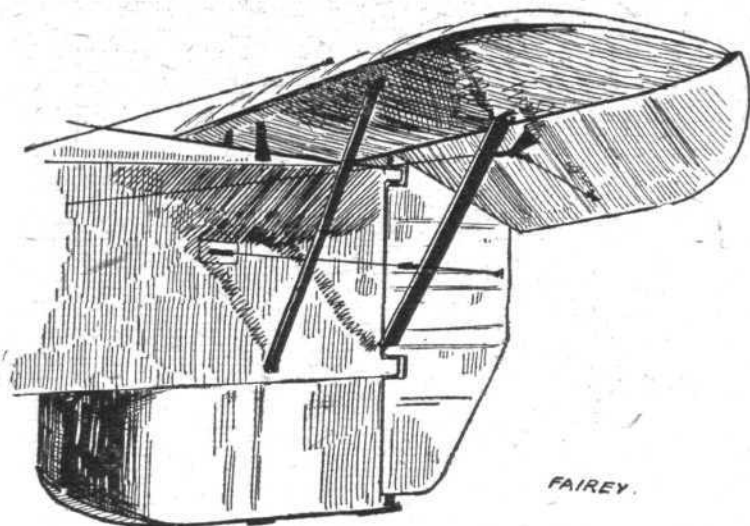


"Flight" Copyright
THE FAIREY SEAPLANE AT OLYMPIA : This machine is a military type, designed for fighting. It carries a very complete armament of guns, and the tail is remarkable for the fact that there is no vertical fin above the tail plane

whole trailing portion of the plane hinged along the rear spar. The trailing edge is operated by a wheel mounted in the pilot's cockpit, and can be pulled down or up at will. Of course, the outer portion of the trailing edges is a separate

so engaged with one another that a turn of the camber-operating wheel also actuates the trimming tail plate. The

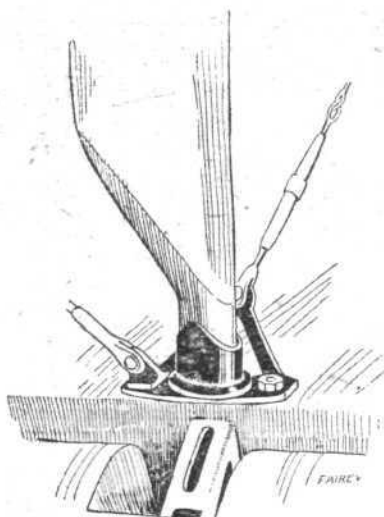
relative setting of the two wheels can, however, be altered by means of the smaller of the two wheels, so that any position desired can be obtained. Once this is accomplished, all the controlling can be done with the larger wheel operating both trailing edge and tail plane. A novel feature of the design of the Fairey XXI is the absence of any vertical fin above the tail plane. The object of this is to give a free field of fire to the rear gunner, and it is accomplished by having the tail plane mounted high up, and by making the body unusually deep at the back. The general effect, as regards appearance, is to make the machine somewhat



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A "FAIREY TAIL" AT OLYMPIA: There is no fin above the horizontal tail plane

unit, and can move independently of the rest, as an ordinary aileron. An innovation of this form of variable camber machine is the interconnection of the control wheel for the camber with that of the tail trimming. The two wheels are concentrically mounted in the cockpit and are normally



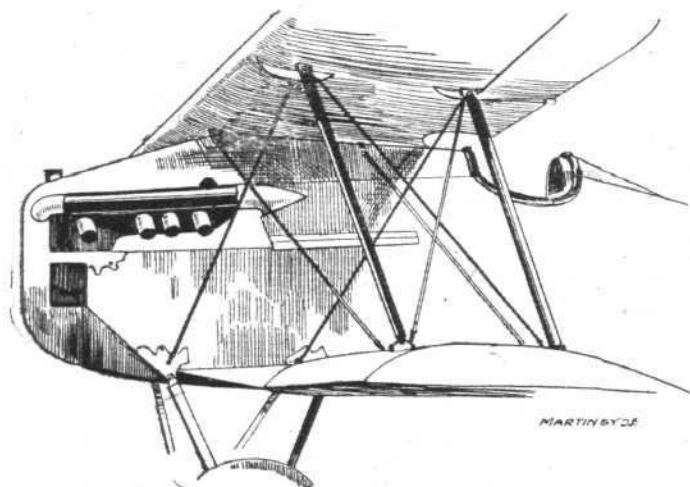
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The Fairey Seaplane XXI: Sketch showing the strut attachment and aileron hinge

what reminiscent of various German seaplanes used during the War. As the machine is designed to a Government specification for the use of the Air Force, we are not at liberty to give particulars of many of the interesting constructional details embodied in the design, much as we should have liked to do so.

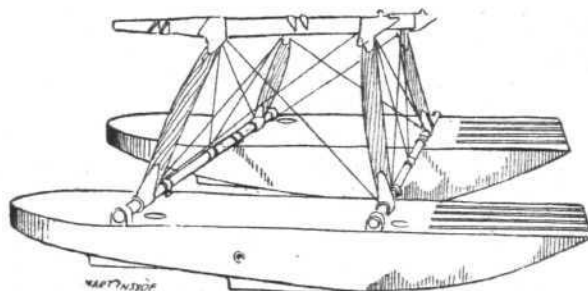
The Martinsyde Machines

In constructional details the Martinsyde machines exhibited follow more or less standard Martinsyde practice. An excellent idea of the wing construction is given on one of the machines, the Type F4A, by leaving the right-hand bottom wing uncovered, so that all the constructional details can be inspected. As always, the Martinsyde workmanship is exceedingly good, and there is evidently no intention on the



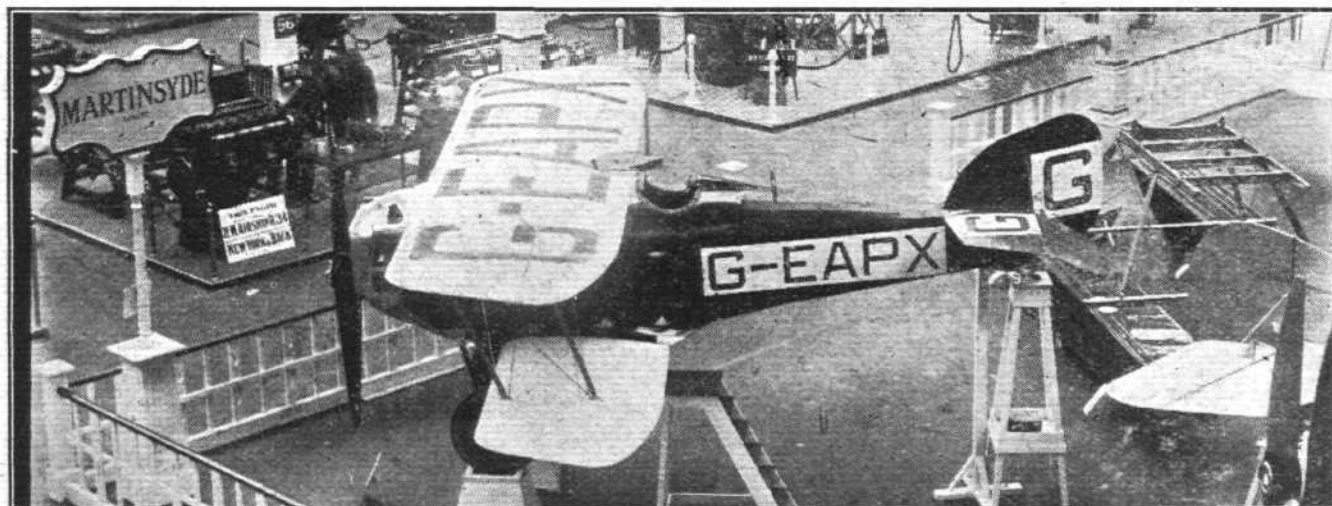
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The fore part of the beautiful little Martinsyde "Semiquaver"



"Flight" Copyright

A Martinsyde float undercarriage



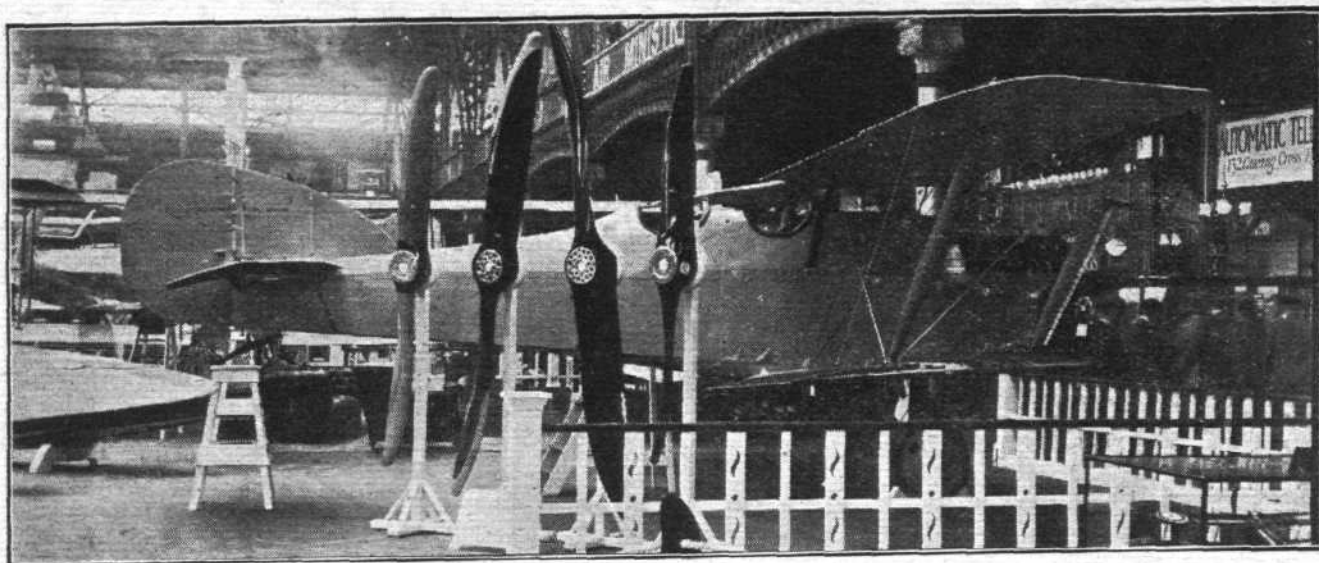
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A RACER AT OLYMPIA: The Martinsyde "Semiquaver" which will be flown by Raynham in the Aerial Derby

part of the firm to scamp work in any way anywhere in order to lower the price.

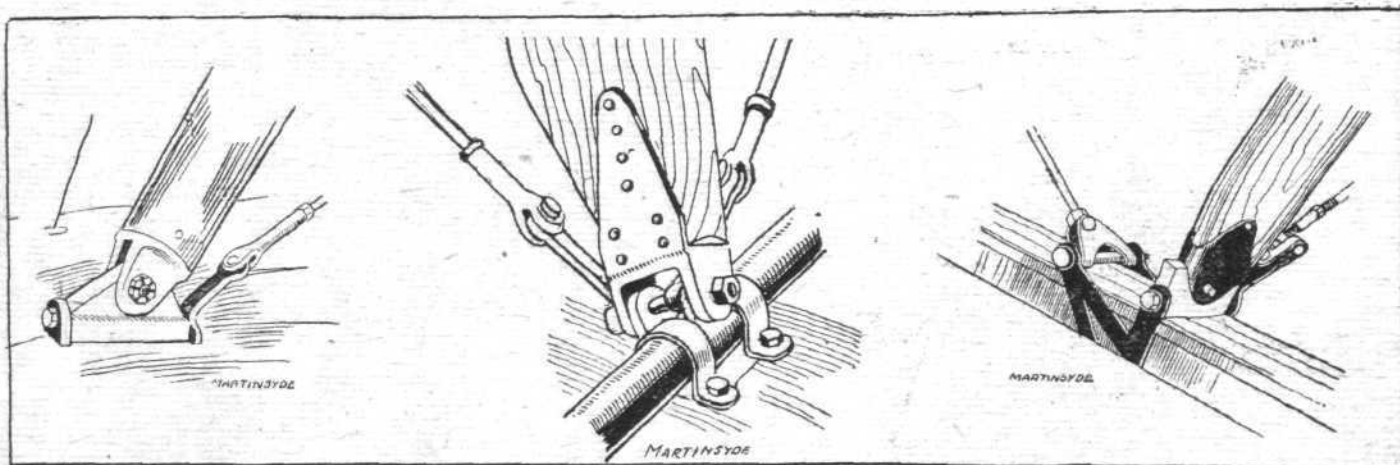
The wing construction of the Martinsyde machine is

interesting, in that the spars, although of "I" section, are built up of three laminations, a thin lamination in the middle, with two thicker laminations at the front and back. These



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THE MARTINSYDE F4A AT OLYMPIA : The four propellers are not mounted on the side of the fuselage to enable the machine to travel sideways, but are on a stand some distance in front of the machine



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SOME MARTINSYDE DETAILS : On the left the interplane strut attachment on the "Semiquaver." In the centre the float attachment to the undercarriage struts of the seaplane undercarriage. On the right the strut attachment on the F4A.

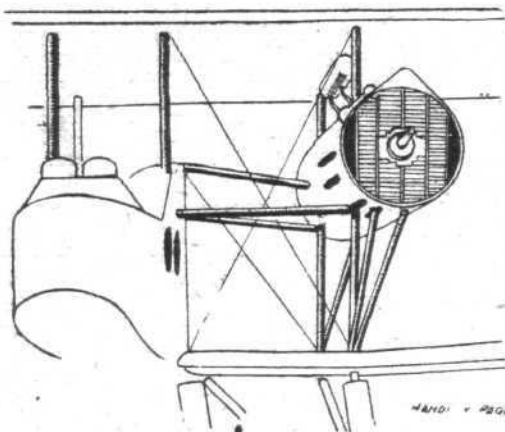


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THE MARTINSYDE CABIN MACHINE, MARK A II AT OLYMPIA : A gauze roof affords ample ventilation of the cabin

outer layers are spindled out in the usual manner to form, with the centre strip, an "I" section, but the difference is that thinner strips of wood are used, and that, therefore, all small flaws in the wood are more easily detected than is possible where the spars are spindled out of a solid piece of wood. The attachment of the interplane struts and lift wires to the wing spars is also worthy of notice. The strut rests on a packing piece of duralumin which is held in place as shown in the sketch. The straps for the lift and anti-lift wires pass down the front and back of the spar and around the opposite side of the spar, the only piercing thus being for horizontal bolts on the neutral axis, which does not in any way weaken the spar.

The body construction of all the Martinsydes also follows standard Martinsyde practice, which has stood the test of time and experience. As regards two of the machines shown, the F4A and the "Semiquaver," the front portion of the body is covered with three-ply wood, whereas in the cabin



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**Diagram of the engine mounting of the Handley
 Page W 8**

machine the fabric covering extends forward right up to the engine housing. The upper part of the body of the latter machine, however, is finished in mahogany, with Triplex windows, and the roof over the cabin is in the form of gauze to ensure thorough ventilation of the cabin.

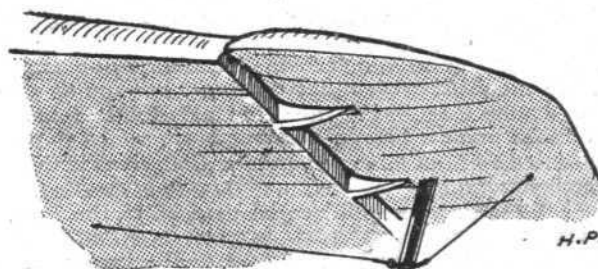
Perhaps from a popular point of view the most interesting of the Martinsyde machines shown is the little "Semiquaver" racing machine, which will be piloted by Raynham in the forthcoming Aerial Derby. This machine is of diminutive size and, like all the Martinsyde machines, of the most beautiful outline imaginable. The wing span is only 20 ft. and with a 300 h.p. engine, the speed is over 160 m.p.h. As the machine is very heavily loaded (over 13 lbs. per sq. ft.) the landing speed is necessarily somewhat high, round about 70 m.p.h. (In the table published last week, the figures of loading per h.p. and per sq. ft. were transposed, and the area should be 147 sq. ft.) That the machine will give

a good account of itself in the Derby is clearly not to be doubted. Generally speaking, the construction is similar to that of the other two machines, but the mounting of the top plane is unusual. Instead of the usual centre section, the top plane, which is in one piece, is attached direct to the body, which at this point has a small fin or hump swept upwards to meet the plane. The result of the absence of centre section struts and bracing is to give the machine a very neat and clean appearance.

The Handley Page W 8

This machine has already been described in *FLIGHT*, so that there is little new to be said about it. Its main feature as a commercial machine is, of course, the large cabin space provided, which affords room for 15 passengers, or, if the machine is fitted up as a cargo carrier, a space 22 ft. long by 6 ft. high by 4 ft. 6 in. wide. The fuselage has been so designed that over this portion of it there is no internal bracing, the entire space being clear of obstructions. As the engines are mounted high up in the gap, the passengers obtain an excellent view, only obstructed to a comparatively small extent by the lower plane.

There is a communication door between the cabin and the pilot's cockpit, the door carrying in front a hinged seat for the engineer, who is then seated at the side of the pilot. As the body is narrow and fairly shallow in front the pilot's view



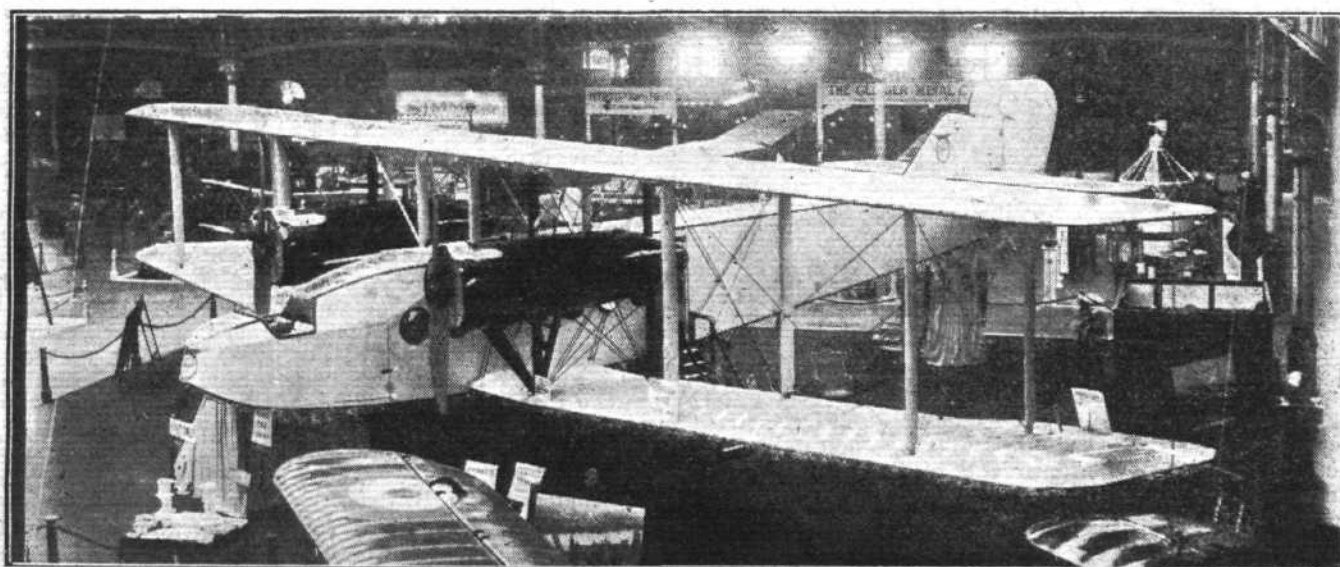
**ON THE HANDLEY PAGE W 8 : Method of
 balancing the ailerons**

is exceptionally good, there being practically no blind spot nor any part of the machine which cannot be seen from his cockpit.

The mounting of the engines is so designed that although they are actually supported inside the wing hinges the engines project outside the ends of the wing roots. When the wings are folded the engines are, therefore, very "get-at-able," and can be fairly easily removed. As the petrol tanks are mounted behind the engines, with a fireproof bulkhead between, the whole forms a unit, and there are a minimum of connections to interfere with the removal of the engine units.

The under-carriage is of the four-wheeled type, each side having its pair of independent wheels mounted on a universally jointed structure of steel tubes which allows of independent movement of each shock absorber.

(To be Concluded)

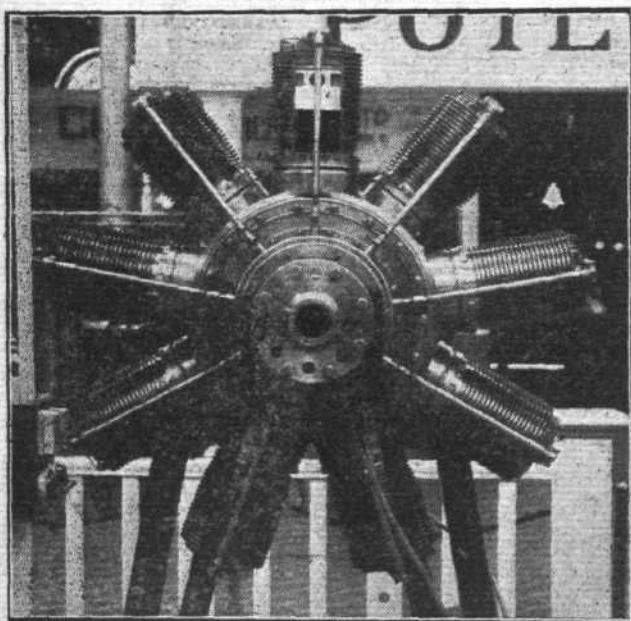


A RECORD BREAKER AT OLYMPIA : The Handley Page W 8 which reached an altitude of 14,000 ft. with a load of 3,690 lbs.

THE ENGINES

It can be said, truly enough, that the exhibits of aero-engines at Olympia are thoroughly representative of British design and development, however equivocal the phrase may be. But setting development aside as a thing of the moment, of tiresome argument in any case, aero-engine design is a subject in which the many who know all about it are doubtless able to form their own conclusions from the recital of the barest facts concerning all examples, and would gain no assistance from any kind of criticism: while the few who profess to know nothing about it, would naturally find anything more profoundly tedious. Proceeding, then, from this most reasonable basis, and taking the exhibits in order of seniority of type, it would appear that two of the most remarkable—as little known and less exhibited than others hitherto—of the rotaries and their complementary radials, are respectively the 220 h.p. nine-cylinder Zeppelin on Stand 61A, and the 450-500 h.p. nine-cylinder "Jupiter" shown by the Bristol Aeroplane Co., Ltd., on Stand 58, of which it is understood they have recently acquired the manufacturing rights under the patents of Mr. A. H. R. Fedden: the designer of both this model and the Lucifer three-cylinder radial of 80-100 h.p. which is also shown.

The chief feature of the Zeppelin rotary—which is of the monosoupape variety in general—is that its cylinders retire from the pistons in the manner of the rotary type, but to a different extent in each of the four phases of the working cycle. This is due to the fact that eccentrics, of 22.5 mm. throw, are mounted with roller bearings, one under each of the nine connecting rods: and are side-toothed together and mounted upon a bronze bonding bush, which is rotated by a patented form of epicyclic gearing that gives it the same rotational direction as the engine: this, it is claimed, being to reduce friction. To afford equal balance to the rods, the eccentrics are arranged for their respective cylinders in the following order from the forward end of the bush: 1, 8, 3, 6, 5, 4, 7, 2, 9, which also agrees with the usual firing order of 1, 3, 5, 7, 9, 2, 4, 6, 8. The epicyclic gear consists (a) of a spur gear fast upon the bronze bush; (b) a driving pinion spindle attached fast to the crank-chamber, centrally in line with the propeller shaft; and (c) an internally toothed ring, surrounding and meshing with both, running as the inner race of a roller bearing of which a drum on the fixed crank is the outer race: and acting thus as an orbital idler connection between the driving pinion and driven gear.



At the Aero Show: One of the chief novelties of the Show: the 220 h.p. 9-cylinder Zeppelin rotary: a monosoupape type of which the most original features are the varied length of the four strokes, effected from a series of eccentrics beneath the big ends, rotated from an epicyclic reducing gear in which the internal toothed orbit ring is the idler connection between the driving pinion and the driven gear; and the consequently variable induction to increase air supply at high altitudes, as controlled by a flexible shaft to a lever controlling exhaust valve action to a variable degree

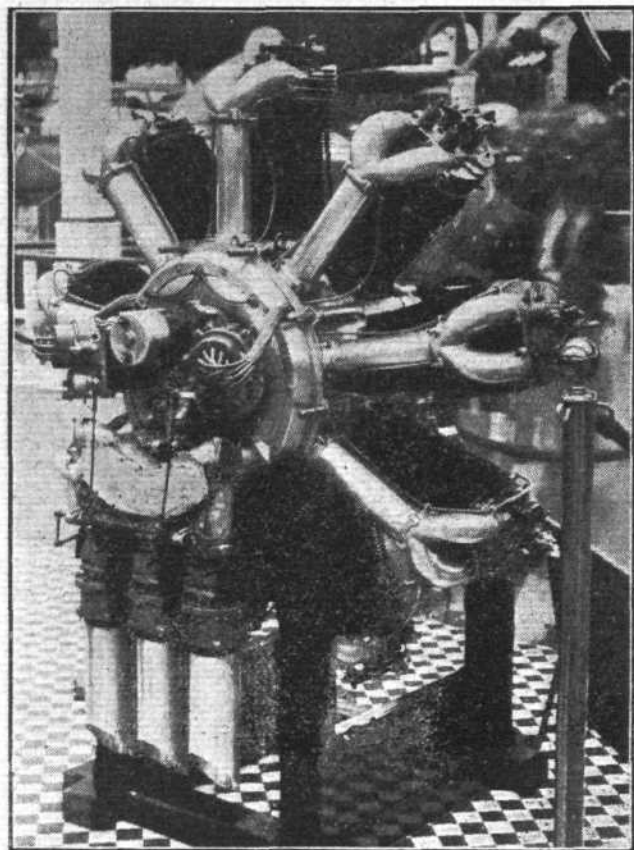
The effect of this eccentric drive motion is that while the crank radius is 101.75 mm., the cylinder retirement or piston sweep becomes 203.5 mm. to the top of the cylinder for the exhaust phase, 226 mm. for the induction phase (inward), 203.5 only on the compression phase to a normal compression ratio (with the eccentric at a right angle to the crank on its half-speed rotation) and 181 mm. only (with the eccentric throw opposed outwardly) during the combustion phase. The extra length of the induction phase movement allows the piston to uncover the monosoupape type circle of mixture induction ports, and the shortened movement during the combustion phase prevents it opening those ports at all. Hence the claim that back-firing into the crank-chamber is impossible.

The exhaust valve motion is effected by a second orbital epicyclic train, in which (a) the orbit ring is formed on the cam-carrier, free to rotate on the shaft extension as the driven member, and surrounding both (b) a sun-gear fast upon the shaft-extension and (c) an idler pinion in mesh with both (a) and (b) freely mounted in a bush in the crank-chamber and so made to track round (b) and thus rotate (a) at one-sixth of the engine rotation speed. A curved wiping lever fulcrumed in the distribution casing is moved from, or engaged with rollers on one arm of pivoted bell-cranks, the other arm of which takes the cam-motion and lifts the exhaust valve tappets. This movement, which is controlled by a flexible shaft, in engagement with the rollers, gives a second, or rather lengthened, exhaust valve lift, in order to expel some of the air that is superfluous from the long induction phase at low altitudes, but is required for full charging at high altitudes and low surrounding pressures: when the wiping lever is moved out of engagement with the rollers. The exhaust valves themselves are of a ring pattern, opening and closing partially annular ports: with the sparking plugs located concentric to both.

The three chief features of the Jupiter 450-500 h.p. radial engine are (1) a mixture ring containing a casting with three spiral convolutions or mixture ways, each drawing from a separate carburettor and delivering the mixture at a higher velocity to three of the induction trunks, each of which has a branch to the two inlet-valves of its cylinder; (2) two sliding weights, die-attached to the crank-balance weights, and connected by rods to side extensions of the master-rod big-end, to correct its excessive inertia stress on its bearing which does not occur with the static master rod in a rotary; and (3) a special form of epicyclic reduction gear rotating the cam-carrier in the opposite direction from the crank-shaft, but at one-eighth the speed. This consists (a) of an orbit ring of 72 teeth fast to the front plate of the valve-gear chamber (b) and (c), idler ring-gears, respectively externally and internally toothed with 68 teeth each, mounted freely on an eccentric fast to the shaft, which gives them motion from (a) by way of the meshing of (b); and (d) an externally toothed ring of 64 teeth bolted to and concentric with the cam-carrier drum—which carries four inlet and four exhaust cams—and meshing with (c). Thus owing to the difference of tooth numbers in the first instance between (a) and (b), the latter receives from the former a delayed rotation three and a half times slower than that of the crank shaft. Then (c) transmits that delayed speed to (d) with a further three-and-a-half speed reduction created between them during that transmission owing to the second equal difference in their respective tooth numbers. Thus the seven-fold delay leaves (d) and its cam carrier rotating at one-eighth the shaft speed: necessary since in each case there are four cams all in line, and all active.

One of these models is shown geared to the propeller shaft through a further epicyclic-gear of ordinary type: i.e., a rotating orbit ring meshing with stationary planets meshed again with a driven sun on the propeller shaft, in a ratio of 1 to 656. This enables the engine to be run up to 2,000 r.p.m. for its full power capacity. The other is shown with direct drive. Further features are that the oil pump, gear driven from the rear end of the crank-shaft, is duplicated so as to scavenge all excess oil from the crank-chamber as fast as it settles, as well as to force-feed it through the crank-shaft to bearings and big ends—excess and oil-mist lubricating the cylinder surfaces—that the two nine-point magnetos are diagonally driven from other gearing above that of the pump: and that between both an electric starter is located: apparently with a free wheel over-run release. Above, the rocker arrangement is somewhat after the Curtiss manner.

The claims for the three-group induction are additional



At the Aero Show: A radial which has many points of interest: the 450-500 h.p. 9-cylinder Bristol "Jupiter" as designed by Mr. A. H. R. Fedden. Special features are an ingenious epicyclic reducing gear driving the cam-drum; a three-way spiral induction, from each of three carburettors grouping three cylinders each independently, and increasing initial mixture velocity, eased later to a fuller intake; and a system of sliding bob-weights that ease the inertia strain of the master-rod big end on its bearing, with their opposed inertia force

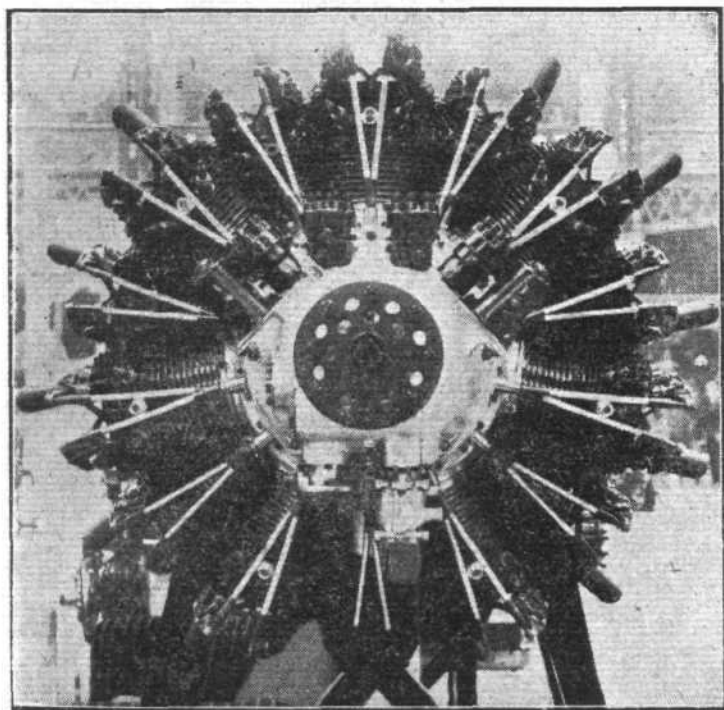
reliability from the independence of each group, in addition to the improved mixture delivery.

The bore and stroke measurements in the Jupiter engine

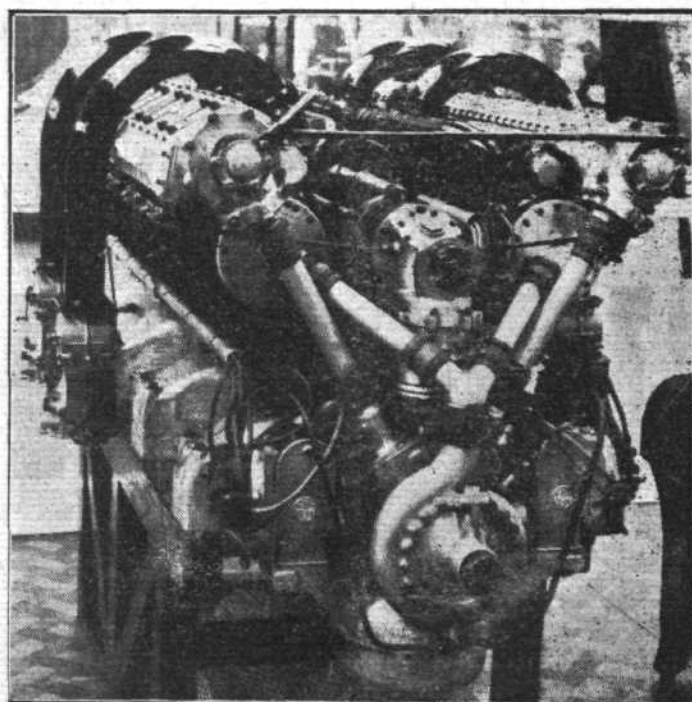
are $5\frac{1}{2}$ in. and $7\frac{1}{2}$ in. with the same bore and an inch-and-a-quarter less stroke in the three-cylinder Y-type Lucifer model, which however has not, nor needs, any more than direct induction from a mixture drum; nor the progressive supplementary bob-weights—two of the connecting rods being pinned to the shoe of the third; nor again more than the simplest of distribution gears for its valve operation—which is otherwise effected through concentric tube and rod tappets to the rockers of single inlet and exhaust valves. The lubrication detail is, however, practically identical. The claim is that the Lucifer is specially designed for reliable continuous service with the minimum of dismantling. The construction of the air-cooled cylinders is the same for both models: machining from solid billets of steel to inch-deep 2 mm. thick fins spaced at an average of $\frac{1}{8}$ in. apart; with aluminium heads bolted to the cylinder crowns, as stiffeners, heat-diffusers and valve-gear mounts.

Two other radials are the 300 h.p. fourteen cylinder and the seven-cylinder 150-h.p. models shown by Messrs. Armstrong-Siddeley Motors, Ltd., on Stand 51. The specification facts in each case are that the cylinders are air-finned steel barrels—apparently cast—screwed into aluminium heads, which each contain one inlet and one exhaust valve bell-crank-rocker operated, with the rockers pivoted in applied brackets of forged steel, freely perforated; the springs being of volute type. Bore and stroke dimensions are 5 in. each. The cylinder mounting in the larger model is in two staggered series of seven each; held by insertion into a one-piece crank chamber drum, and clamp-locked with taper rings, readily freed. No details are available as to the design of the reduction-gearing operating the valve tappets: but it is understood that the crank-shafts—respectively two cranks and one—have balance weights. Both models have dual ignition, stated to be combined magneto and Remy system: but as shown, have it respectively from four and a pair of Remy seven point distributors, mounted radially on the distribution casing in front, and driven and timed from the gearing within. The same ratios and firing order as other "fourteens" and "sevens" hitherto, may be inferred. In each case, however, the lubrication system practically scavenges the crank chamber, as the double oil pump draws from it, and through a filter; before force-feeding through the hollow crank-shaft to all bearings and back *via* the distribution gearing. Still another feature is that the induction trunks—from a single Claudel carburettor for each seven cylinders—are hot air jacketed from the exhaust manifold. Both models too, have compressed air-starting, albeit not fitted in the examples shown.

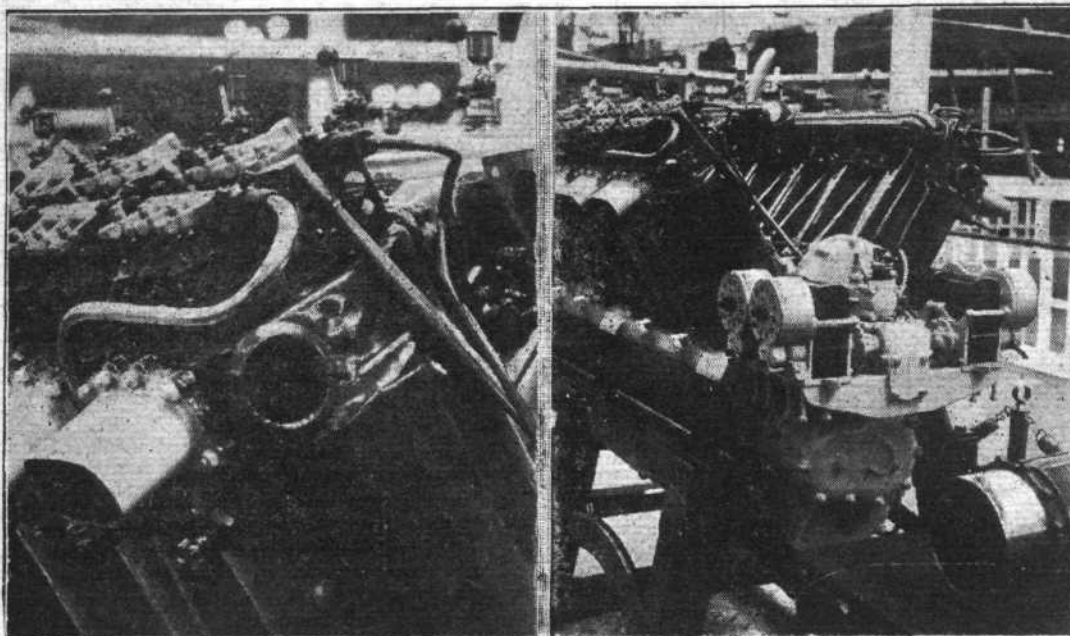
Most prominent among the engine exhibits are those of the Vee-type: and of these the most powerful, though not the largest or even heaviest for its horse-power, is the 800-900 h.p.



The 300 h.p. 14-cylinder Siddeley-Armstrong radial. Plainly designed for hard service, and the only engine in the Show employing battery-coil and distributor ignition



Three-quarter rearward view of the remodeled 500 h.p. 12-cylinder Siddeley-Armstrong "Tiger." Stout construction and neat mass moulding is the principal feature



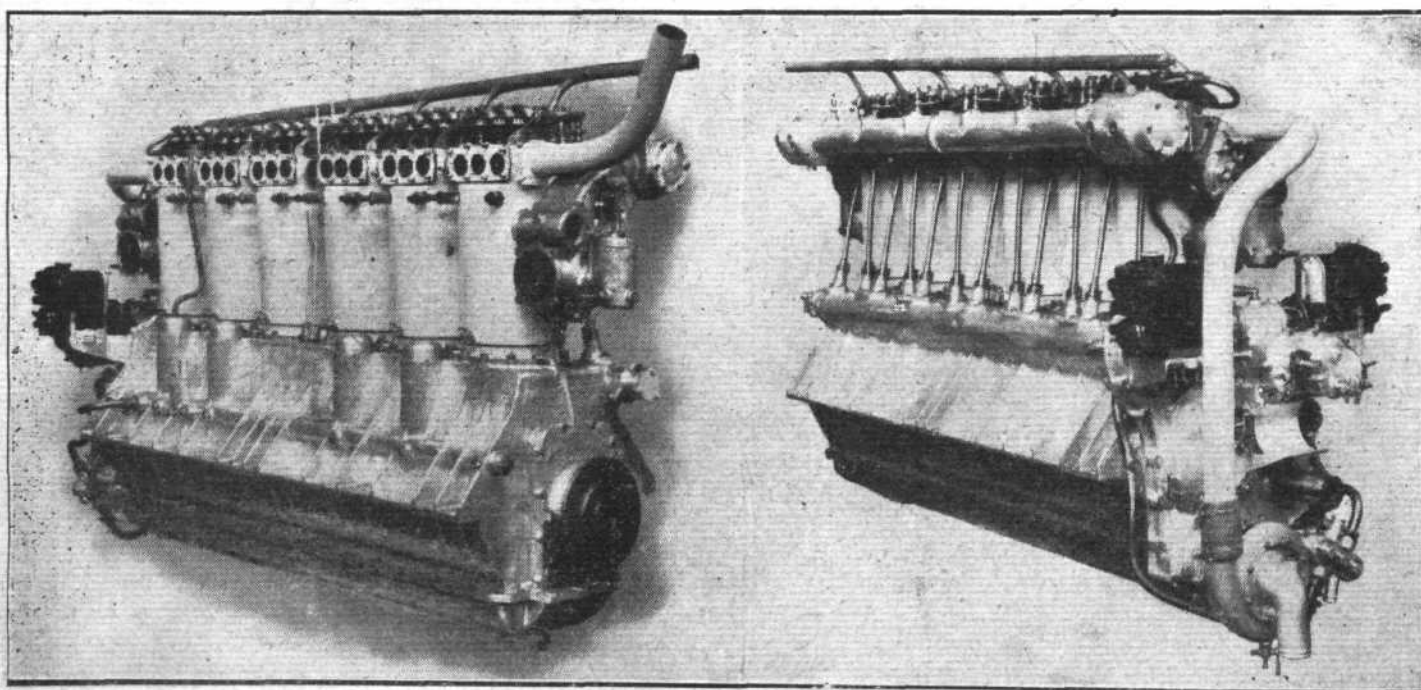
At the Aero Show : Close view of the Sikh cylinder head and valve-gear detail ; showing the manner of the single-stream high velocity water flow—the only water connection—along the exhaust valve-line ; the line lubrication of the valve-gear through the long tubular pivots of the bell-crank-rockers, with their inserted metal and rubber connections ; and the location of the four spark-plugs in the cylinder head. On the right three-quarter rear view of the 800 h.p. 12-cylinder Sikh engine. Chiefly displaying ignition detail and controls ; the petrol tank air-pump ; and behind it the cover plate facilitating the withdrawal of the camshaft

twelve-cylinder Sikh, which has its cylinders—180 mm. bore and 210 mm. stroke—mounted as ring-connected units in two banks at 60° and secured to the crank chamber by the usual foot-bolts, supplemented by dog yokes carried upon the suspension bolts of the eight crank-shaft bearers. As a departure—both in this and the 400 h.p. six-cylinder vertical Sikh—from the Sunbeam construction of aluminium with steel liners in other models, each cylinder unit is of steel, with steel waterjackets welded on, and moulded to a rectangular shape at the heads, thus providing space for three exhaust valves on the outer side and three inlets on the inner side : each valve-set being operated by three-finger overhead rockers, with a single thumb piece to tappet rods actuated from an encased cam-shaft at the bottom of the V. As with all makes exhibited except the Beardmore, the cylinders are dismounted, unit or block, and all adjacent parts freed or dismounted to dismount any valve. The rockers are mounted on steel bracket forgings, perforated to lessen weight, and their tubular pivotal parts are interconnected by rubber-jointed metal-tube sections, inserted so as to form a continuous oil-lead, with a U connection at the forward end : one end at the rear uniting with the supply lead from the crank-chamber through the rearmost breather,

while the other end unites with the return lead into the distribution gear.

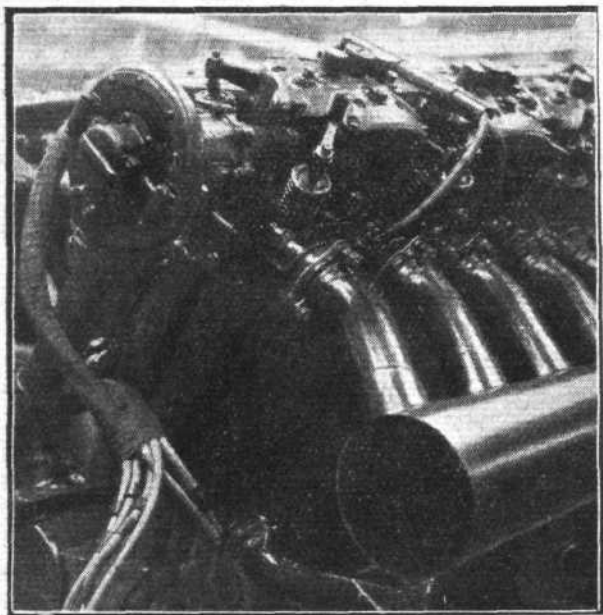
Known practice is followed in the Sikh induction, which runs from a water-jacketed carburettor located high at each bank end, with direct flow round one bend into omnibus type mainfolds—there being four carburettors in all—and in the water-circulation system. This latter, from large-output centrifugal pumps located beneath the base chamber, and skew gear driven direct from the crank-shaft, delivers the water through the rearward carburettor waterjacketing, and onward in a high-velocity flush along the exhaust valve line only, in one direct lead constituted by the unions between the cylinder heads.

The constructive design, with the number of valves—two more for each unit than any other—and the quadrupled ignition to all units from four twelve-point magnetos, rearwardly platformed and driven from that end of the cam-shaft—where this shaft can be withdrawn by removing an end plate—first by a bevel and then by helical gearing to their spindle-couplings from the main central driven spindle, from which also an air-pump drive is taken—may be perhaps regarded as the chief external features. The firing order is 1A, 1B, 5A, 5B, 3A, 3B, 6A, 6B, 2A, 2B, 4A, 4B. Internally,



AT THE AERO SHOW : Three-quarter views of the exhaust and induction sides of the 400 h.p. 6-cylinder Sikh. These display the water-inlet on the same principle as in the 800 h.p. model, but from a pump located aft, and driven from the distribution gear. Also the induction in the Maybach manner from a water-jacketed carburettor at each end. The quadruple ignition is also fitted

the features are that the nickel chrome steel connecting rods are alternately forked at their big ends over their opposites on the same crank-pin; thus bringing the cylinder masses into direct opposition: and that dry sump dualised lubrication is employed, as from two pumps also driven from the nickel chrome-steel crank-shaft by skew gearing. One of these pumps clears the oil from the base chamber and returns it to the oil tank to be cooled, while the other is duplicated



At the Aero Show: Valve gear detail of the unit of the 600 h.p. "Condor." It will be seen that the four valves are set in diagonally into four quarters of the domed combustion space, and have their four rockers actuated from two centralised cams

and so geared internally that the high-velocity part force-feeds the oil drawn from the outside oil tank to the main bearings and big ends through the hollows in the webs and straights of the crank-shaft, while the low-velocity part lubricates the cam-shaft and all auxiliary bearings: the cylinder surfaces being lubricated by the oil-mist from the high-velocity circuit excess. The design of the crank-chamber itself has been specially devised to give greater strength and to allow the bearing caps to take a larger share of the side thrust under the usual working stresses.

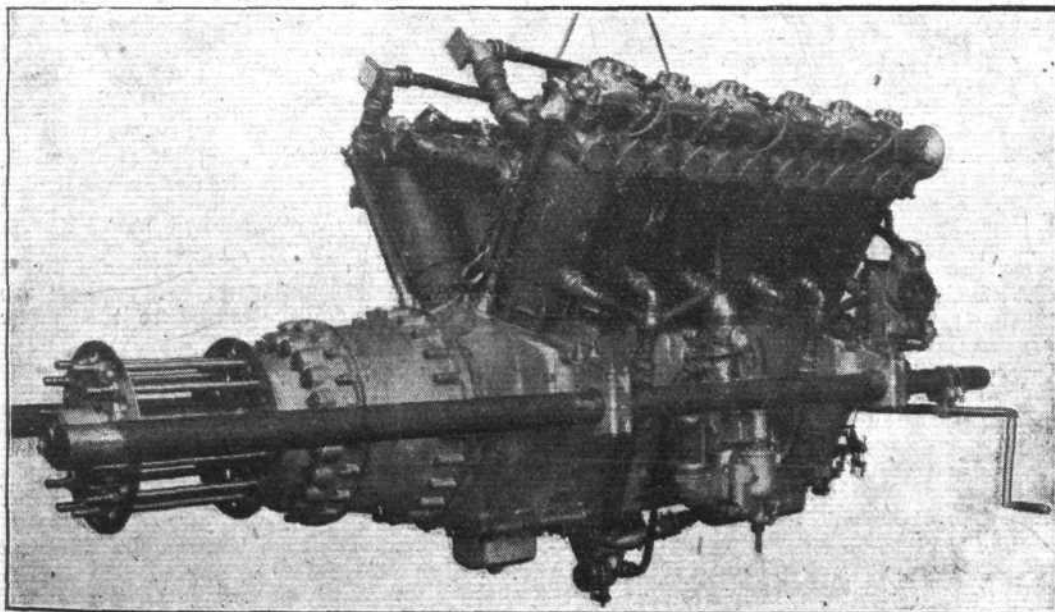
The same description applies to the 300 h.p. six-cylinder Sikh vertical engine: except that the single water-pump is

mounted on the tail of the crank-shaft vertically, and that only two magnetos are fitted; to which the main drive is by spur-gearing from the cam-shaft end, and then by helical gearing, as before, from the driven spindle to the laminated blade couplings. This smaller engine is shown with direct drive to the propeller: but the 800-900 h.p. model has the same design of spur-gear reduction as in previous Sunbeam V-type models, but proportionately enlarged, and with a ratio of 1,400 r.p.m. to 920 r.p.m. on the propeller, in a clockwise rotation. The total weight, empty, of the larger Sikh is 1,952 lbs., and that of the smaller a little over half that weight.

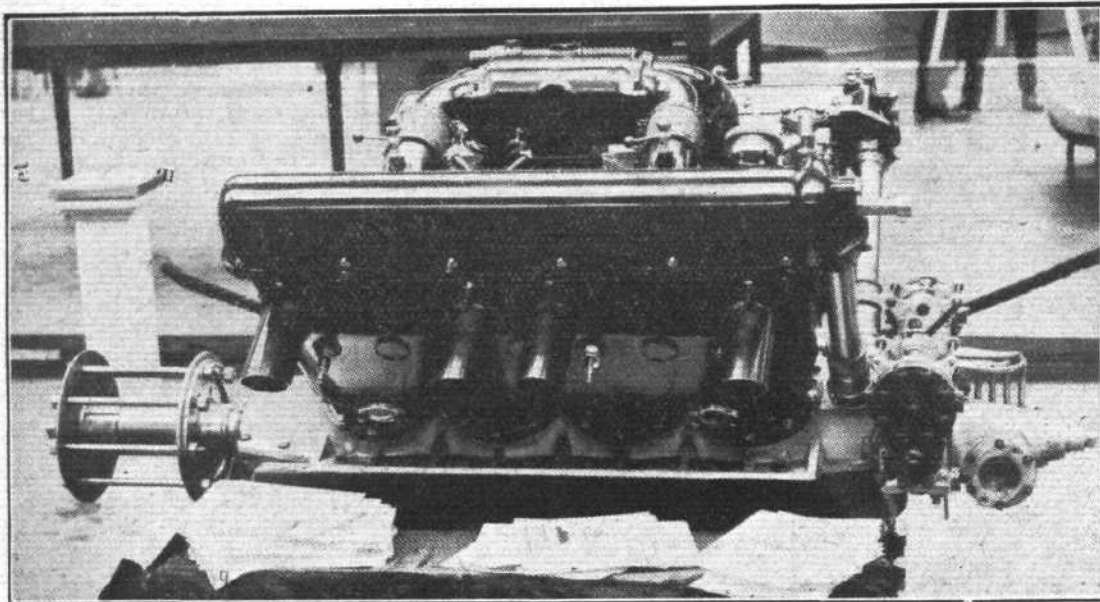
The 500 h.p. Vee-type twelve-cylinder Siddeley "Tiger," now exhibited for the first time on Stand 51, has apparently been largely re-designed from the original model; chiefly to follow known Continental air-ship engine practice as regards the mounting of units with open sides butted together with circular rubber unions to give a complete end-to-end flush around the combustion heads and valve-jacketing, as from two water-inlet branches from a centrifugal high-output pump mounted on the tail of the crank-shaft as illustrated. The bore and stroke are 160 mm. and 180 mm. respectively. The overhead valve gear is mounted in two blocks with access panels at the side, over each bank, which is set at a 60° angle to its opposite. The valves, two inlets and two exhausts to each cylinder, are set in diagonally and bell-crank operated. A feature is that the cam-shafts are helically splined through the driven skew gear so as to move lengthwise through it, and also carries lever armed collars, likewise internally threaded on a quick pitch, to give that end-long movement to engage ramp-extensions of the exhaust valve cams, and relieve the compression for starting: the lever arms being interconnected. The induction is of the omnibus bar-type—four bars feeding three cylinders each—and mounted inwards of the V: but is supplied by way of four long trunks curved over the top of the banks to suspend as many Claudel carburettors outside the V, at crank-chamber level. The lubrication is of the dry sump type, quadrupled: the central supply pump, which is driven from the crank-shaft, drawing from an outside tank, and delivering to a triple distributing pump feeding three of the main bearings. There the oil enters the hollows of the crank-shaft, passes to the crank-pins, up the hollow connecting rods to the cylinder surfaces by way of the gudgeon pins, in the usual force-feed manner; but an equal volume of it goes to the four other main bearings and thence escapes to the sump, where two return or scavenge pumps are submerged at either end.

The usual drive-gear—a bevel-train—is located at the rear end of the crank-shaft, both for the valve gear drive and for a transverse drive to the two twelve-point magnetos placed aft. In addition, a starting motor of Lucas make, mounted transversely, gives a bevel gear drive to an encased vertical spindle, which at its lower end has a bevel meshing up with the main drive bevel on the crank-shaft. One of these bevels is understood to contain a free-wheel clutch connection with its spindle, which overruns as soon as the start is effected.

The mass-construction follows the usual Siddeley practice



At the Aero Show: Three-quarter forward view of the most highly elaborated Rolls-Royce model—the 12-cylinder 600 h.p. "Condor." The harmony of all detail and freedom from encumbrance despite the thorough fashion of the distribution of water supply and induction, are specially displayed. Other points are the four-way valve control from two cams in each case, and the harmonious modelling of the epicyclic propeller-shaft reducing-gear encasement with the crank chamber



A familiar French model of noted War service : a 300 h.p. Hispano-Suiza : a type with many records

of steel barrels screwed into aluminium heads and jackets, with bronze seatings for the valves, and the cylinders are dog-yoked to the crank-chamber, as from the bearer supporting bolts.

As will be seen from the illustration, all the mass and detail treatment of previous Rolls-Royce practice, as in the Eagle and Falcon models, generally prevails in the design of the 600 h.p. twelve-cylinder "Condor," now exhibited for the first time on Stand 53; along with examples of the 360 h.p. "Eagle" and the 275 h.p. "Falcon," and the 100 h.p. vertical six-cylinder "Hawk": the details of which and their records are too familiar to need recapitulation. The chief difference in the "Condor" design is the provision of four valves per cylinder, diagonally set into the four quarters of the cylinder heads, and actuated X-fashion by four bell-crank rockers converging upon two cams. The induction is by four six-branched manifolds to groups of three cylinders: all within the Vee, but paired to unite T-wise, to two connecting trunks between the cylinder groups, running in an easy bend outwardly of the V to the water-jacketed trunks of Claudel carburettors snugged into the angle of the cylinder bank and the crank-chamber. The water connections are in four triplicate manifolds outside the Vee, and feeding to the bottom of the water-jackets: while the connections for the water collection are made in one lead by way of rubber and clamp joint unions between the cylinder jackets on the valve-line. Altogether there

are some fifty of these rubber connections about the engine, all of which are moused with steel cable in the channelling of the clamping rings. The four water inlets are supplied from a fourway centrifugal pump, located horizontally beneath the centre of the base chamber, and driven from the crank-shaft through helical gearing.

Ignition detail is all as in previous Rolls-Royce practice, both in the use of two twelve-point magnetos, and in their location. Here a distinctive point is that the ignition cables carry numbered collars, and the distributor plate of each magneto is numbered at the terminal insertions in the order of firing 1A, 6B, 4A, 3B, 2A, 5B, 6A, 1B, 3A, 4B, 5A, 2B, clockwise on the starboard plate, and anti-clockwise on the port one.

Beneath the starboard magneto a Lucas starting motor is suspended transversely from a tube extending from the magneto bracket. Its spindle drives upon a helically-toothed collar free on the shaft end, but dog-clutched thereto by a fork from a spring controlled rock-shaft; which is linked to a little spindle and control wheel—their motion being also controlled by the same springs as the rock shaft—that carry the encased contacts to the dynamo cables below the port side magneto. Thus when the wheel is let go, the electrical connection is cut out simultaneously with the declutching of the starting collar. The Condor engine runs anti-clockwise on the propeller, through an epicycloidal reducing gear.

Royal Visitors to Olympia

WING-COMMANDER H.R.H. THE DUKE OF YORK, attended by Wing-Commander Louis Greig, visited the International Aero Exhibition at Olympia on Tuesday morning. He was received by Maj.-General Sir Frederick Sykes, Controller-General of Civil Aviation, Air Commodore R. K. Bagnall-Wild, Director of Aeronautical Inspection, and Mr. H. White Smith, Chairman of the Society of British Aircraft Constructors. His Royal Highness spent over an hour and a half examining the exhibits.

In the afternoon of the same day H.R.H. Princess Marie Louise visited the exhibition, as also did Mr. Winston Churchill, the Secretary of State for War and Air.

The Aviation Pioneers' Dinner

ON JULY 12 a highly successful gathering at the Connaught Rooms was held, when the great hall was well filled with guests. Wing-Commander H.R.H. the Duke of York, attended the function, over which General Seely presided. The speakers were well chosen to represent this unique occasion and we hope to give a full report of the proceedings in our next issue. Exceptional pressure upon our space, owing to the Aero Show report, renders it impossible to include it in this number. A striking feature in the room, in addition to a number of aviation trophies which were distributed upon the banqueting tables, was the original Roe "double triplane" with which Mr. A. V. Roe made history upon the Lea Marshes.

R.A.F. Reunions

THE 113th Squadron of the R.A.F. will hold their first annual reunion dinner at the Holborn Restaurant on Saturday, July 31, at 7 for 7.30 p.m. All who have been associated

with the squadron as officers are invited, and should write for particulars to Mr. J. H. Storey, the Grand Hotel, Rhyl, North Wales.

Long-Distance Flying in Australia

WORD comes from Melbourne that a 100 h.p. Boulton and Paul biplane has recently flown from Sydney to Melbourne in 6 hrs. 37 mins. and that a 100 h.p. B.E.2c has made the trip from Sydney to Brisbane in 7 hrs. 24 mins.

An Australian Record

A MACHINE carrying three passengers and piloted by Capt. Vigers is said to have attained a height of 4,600 metres, which is claimed as an Australian record.

A Hawker Relic for Newfoundland

THE under-carriage which Mr. H. G. Hawker dropped from his aeroplane on his pioneer attempt to fly across the Atlantic has been recovered and presented to the public museum at St. John's, Newfoundland.

Major Schroeder's Altitude

THE U.S. Bureau of Standards have issued a report on the altitude flight of Major R. W. Schroeder on February 27, 1920. The report states that the clockwork of one of the barographs stopped, the record of that barograph was disregarded. After testing the other barograph and correcting for instrumental errors and temperature variation it is computed that the "probable altitude" attained above sea-level was 33,000 ft. while calculating by the F.A.I. rules for 1919, as interpreted by the Aero Club of America, the figure would be 38,180 ft. The machine used was a Le Pere biplane, fitted with Liberty "12" motor with supercharger.

THE AIR MINISTRY EXHIBITS

CONSIDERING the space at their disposal, the Air Ministry have arranged in the gallery of Olympia a wonderfully complete and exceedingly interesting display of what we might call the lesser-known side of aviation—lesser-known, that is, to those not actually in the industry. It is divided up into various sections, each quite comprehensive in itself, and those who visit the show should make a point of reserving sufficient time to enable them to "do" this part of the exhibition thoroughly. It is an education in itself, and whether one is actually engaged in the industry or only interested in aviation there will be found plenty of exhibits which will well repay study.

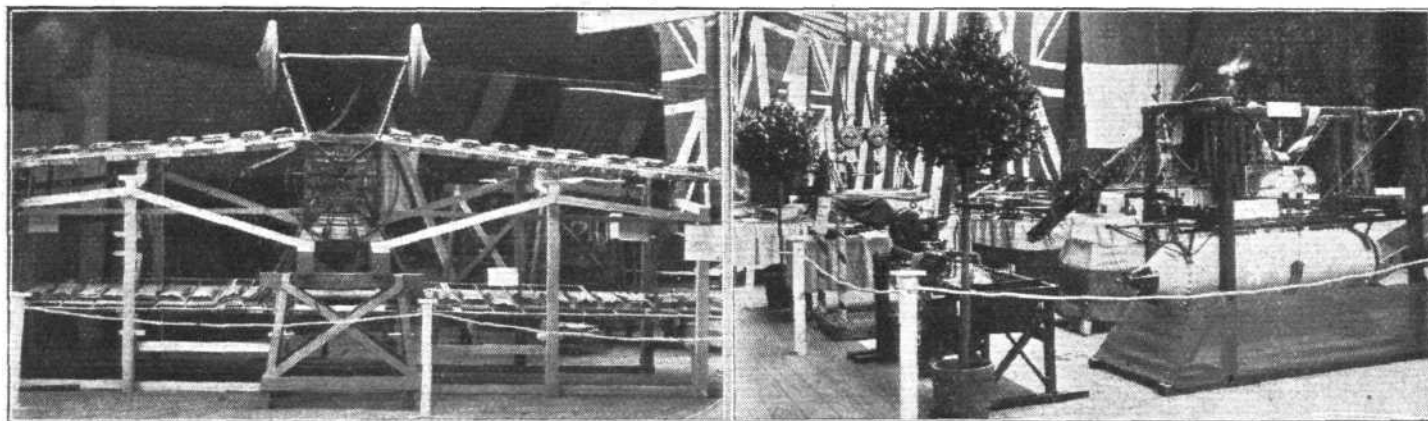
Starting at the main entrance end on the right we have the Airship section. Here are some full-sized cars and parts of the various types of lighter-than-aircraft:—A complete car, with Rolls-Royce Hawk engine, propeller and instruments, of the S.S. Zero type, noteworthy for its compactness; the central engine car, constructed of duralumin, of R.29 Rigid; the control car of R.37, also of duralumin construction, complete with "padded cell" for the wireless operator at the rear; and an engine car, complete with engine and propeller, of R.31—one of the wooden rigids constructed by Short Bros. The last-mentioned is also of wooden construction, of streamline form, being built up of channel section *longerons*, stringers, lightened formers and outer diagonal layers of three-ply. The cockpit is covered in by a hood, consisting of fabric stretched over stringers and, for the fore portion, of plywood with celluloid windows. The radiator is mounted in front of the nose, with a water tank above and behind it,

drawings give some idea of the various types of airships, past and present. Proto breathing apparatus, and various types of parachutes complete the airship exhibit.

Adjoining the foregoing section is the Medical group. This is not, as some would unkindly suggest, confined solely to first-aid and ambulance work, but deals with a variety of matters, and many visitors will doubtless be astonished at the extent of the medical side of aviation—the great care which is taken with regard to the health, safety and comfort of the aviator. A *fuselage* is shown in which a pilot and observer (nice-looking boys, too!) are not only protected against the effect of accidents, by means of scientifically thought-out padding, but are also correctly and hygienically clad. Here the different character of the work of each is considered, and his cap and gauntlets are designed accordingly. Then there are the suits, some fire-resisting, some electrically heated, and other for life-saving, waistcoats, which will sustain you in the water, and examples of many different kinds of goggles, scientifically planned.

The question of altitude flying brings us to some very interesting oxygen-breathing gear, from the original type of high-pressure cylinder as first supplied to the R.F.C., to the latest type of liquid-oxygen installations and masks.

A quick-release safety belt, used throughout the War, is also shown, together with a safety helmet which is designed to spread the effect of any concussion in such a way that a fracture at the base of the skull is avoided. Another interesting item is an "example" of one day's ration as provided to the crew of R.34 during the famous Atlantic flight. These



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AIR MINISTRY AT THE AERO SHOW: On left: Apparatus for testing to destruction of main planes under flying conditions. On right: The Armament Section, showing on the right of the stand an 1,800-lb. bomb and carrier

in front of the hood. Amongst the instruments in the cockpit may be seen an engineer's indicator, or telegraph operated from the control car similar to that found on steamships, with "ahead, astern, stand-by," etc. The R.29 and R.37 cars are built up of the usual duralumin channel longitudinals and *w-braces*, similar to those used on Zeppelin ships, and are almost totally enclosed, the covering being sheet aluminium for the lower portion and laced fabric for the upper portion. Large windows, of unbreakable glass or celluloid, are provided, and the W.T. cabin of R.37 is covered with plywood with an inner padding of felt to keep out the noise of the engines.

There are several sections of girder showing various forms of construction, both in duralumin and wood. In the latter cases, the longitudinals are generally of box-form, triangular in section, and the sides of the girders are either lightened three-ply or a lattice of solid wood cross braces. By way of comparison specimens of Zeppelin girder work are also shown, including an interesting sample of cross-girder work from the L.33, which was brought down during a raid on England.

Among other components of rigid ships are a complete rudder from R.32, manoeuvring and automatic valves, petrol tanks, etc., while non-rigids are further represented by examples of valves (S.S. and N.S.), components of rigging, fabric fittings, and a large scale model of an S.S. Zero type airship.

There is also a very interesting collection of instruments as used on all types of airships. There is also a model of the Royal Airship Works at Cardington, Bedford, showing the general layout of the hangars, workshops, etc., and two mooring masts, with airships attached, give a finishing touch to this "bird's-eye view." A collection of photographs and

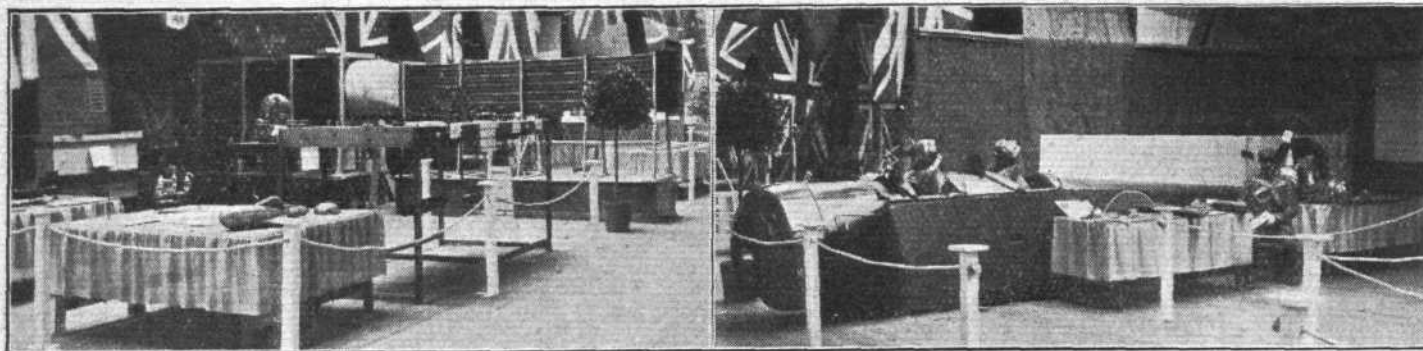
were chosen specially to give the maximum amount of nutriment with the minimum weight.

Coming to the purely medical side, there is an elaborate display of apparatus and tests utilised in ascertaining the ability of aviators to fly at great altitudes, and the physical condition of aviators generally, but it is impossible to detail them here. First-aid work is, of course, well represented, including a design for an aerial ambulance, now being built by Messrs. Vickers, Ltd.

The National Physical Laboratory section is, although perhaps somewhat limited as regards the number of exhibits, of considerable interest, representing as it does one of the most important branches of aviation. The principal exhibit here consists of a 2-foot wind tunnel, with aerodynamic balance, which is a scale model of the 4-ft. and 7-ft. tunnels in use at the N.P.L. Laboratory. This model is fitted up with a fan so that demonstrations of the method employed in its working may be given for the benefit of visitors. Another exhibit shows the method of suspending models in the tunnel and connecting them to the recording or measuring instruments, when ascertaining (a) the Lift, Drag, and Pitching Moment of a Flying Boat; (b) the Head Resistance of a Rigid Airship, or streamline body, and (c) the Damping of oscillation of an aeroplane.

Various models employed in wind tunnel tests are also displayed—all of which, by-the-way, exhibit beautiful workmanship.

A water channel for experiments on fluid flow is another interesting item, but, owing to the excessive vibration of the gallery, demonstrations with this are not entirely satisfactory. This apparatus is intended to give visual effects of fluid flow behind a cylinder and an aerofoil by means of a jet of coloured



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AIR MINISTRY AT THE AERO SHOW : Left : Portion of N.P.L. Section, showing 2-foot tunnel. Right : General view of Medical Section, showing "Safety" fuselage and oxygen gear

liquid impinging on the model—which is immersed in a steady flow of clear water.

How a model airscrew is mounted in the wind tunnel and the thrust and torque are measured is also demonstrated. A simple, but reliable and accurate, device for measuring air speed in tunnel work is shown in the tilting manometer, in which a combination of the pitot tube and a U tube containing water form the principal components.

Other N.P.L. exhibits consist of an apparatus used, in connection with the William Froude National Tank, for testing models of flying boat hulls, floats, etc., and measuring the resistance, running angle and lift; a compressed air jet by means of which it is possible to inflate the air bags of a floatation gear (used on ships' planes) not only with great rapidity, but using a compressed air cylinder of very small capacity. It is, in other words, a form of induction feed, the jet of compressed air, discharging into the float-bag, inducing with it a supply of air from the surrounding atmosphere, in the proportion of about 15 cu. ft. for each cu. ft. of compressed air. A small section of the N.P.L. exhibits is devoted to metallurgy. Here are shown samples of light alloys, developed at the N.P.L., in cast, forged, rolled, and machined conditions. Some very thin sheeting, suitable for wing covering, is also shown.

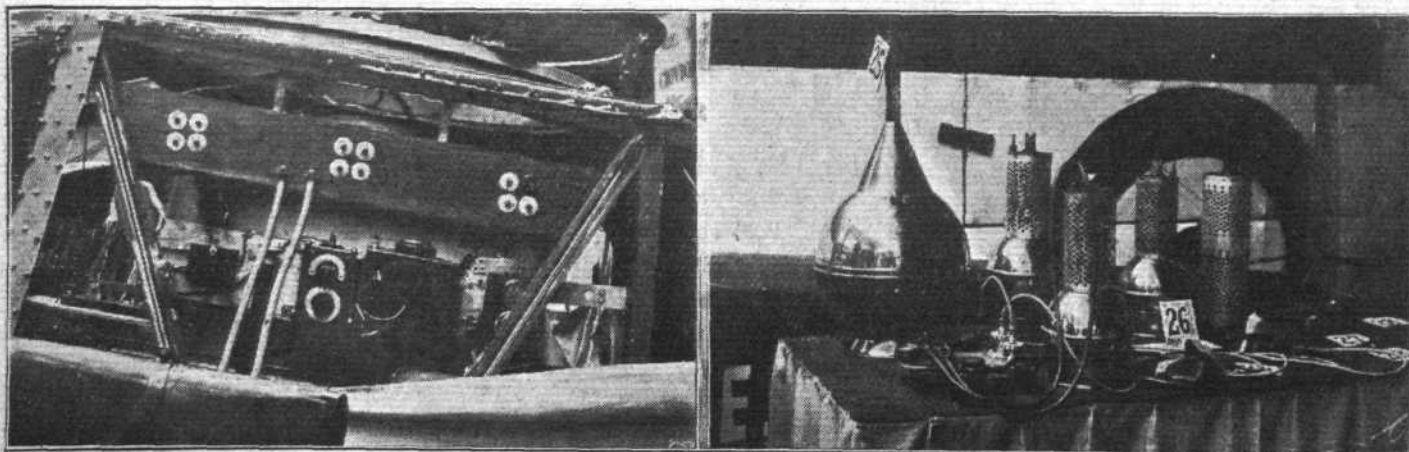
The Meteorological Office is, of course, well represented, and has a very popular exhibit in the form of a large map of the British Isles and adjoining portion of the Continent on which the latest weather reports from all the important centres are marked up from time to time. Thus, one is able to ascertain at a glance whether or not the wife's mother is having pleasant weather down at Somewhere-on-sea this afternoon, and if the visibility is bad enough for her to miss the edge of the cliff. There are also examples of all the various instruments employed in measuring and recording weather conditions and other mysteries of the atmosphere. Some of the maps and charts are instructive to the mere lay mind, as for instance, one showing the normal meteorological conditions on the London-Vancouver, London-Cairo, Cairo-Calcutta, Cairo-Cape, etc. air routes. Some very fine photographs of clouds, taken from an aeroplane by Capt. C. K. M. Douglas, are also well worth studying.

The next section, under the heading of "Communications,"

is chock-full of interesting items, dealing with the navigation side of flying. They are grouped into separate divisions, such as air routes and maps, navigation instruments, landing and navigation lights, wireless telephony, direction finding and signalling, aerial photography and photo-maps. The latter branch is vastly interesting and indicates a sphere of usefulness in the aeroplane which in itself alone possesses enormous possibilities. A "mosaic" map, made up of a series of aerial photographs, of the battle point in France from Lille to Douai will be found most fascinating, as is another of Dunkirk showing the docks and town. Some of these photo-maps are mounted on existing drawn maps, and the extent to which both coincide is amazing, incidentally showing how accurate the modern map-maker's art is. An immense scale map of the aerial route between London and Paris, complete with machines (to a slightly large scale) *en route*, is very interesting, showing as it does the various aerodromes (customs and ordinary), aerial lighthouses, stations with names marked—white letters on ground or roofs (Ashford, Tonbridge, Edenbridge, and Redhill), emergency landing grounds, W.T. and D.F. and meteorological stations. A large scale map of the world shows the various long-distance flights that have been made, viz.:—Trans-Atlantic, New-York-San-Francisco, London-Australia, London-Cape, Rome-Tokio, etc. Another exhibit, much appreciated by the "young visitors," is a scale model of Croydon Aerodrome, complete with buildings, A.G.A. lighthouse, landing lights (wind direction) and machines.

The wireless section is well patronised by visitors, and rightly so, for this fascinating science is not only fully represented by examples of all kinds of transmitters, receivers, amplifier and valve sets, and many other instruments, but practical demonstrations in wireless telephony and direction finding are given at intervals during the day. For the former purpose a fuselage (Bristol Fighter) is fitted up with W.T. and holds conversations with a station situated at the opposite end of Olympia.

Before passing to the Armament display photographers should not miss a fuselage (stowed away in the corner) in which is fitted an aerial camera (L.B. type) operated by a wind-driven airscrew, and one or two other types of aerial cameras displayed on a table alongside. In the armament section



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AIR MINISTRY AT THE AERO SHOW : Left : Wireless installation on Bristol Fighter. Right : Oxygen vaporiser

are found various examples of bombs, large and small, and bomb release gears, an assortment of machine guns, including a Vickers complete with sights, mounted on a bench with C.C. interrupter gear, a "C.O.W." non-recoil gun with specimen rounds of ammunition, and a Scarff ring gun mounting with "Norman" wind vane sight, and twin gun attachment drums.

Last, but by no means least, comes the Inspection and Testing section. Here, as in the case of the N.P.L. section, one finds a difficulty in dealing briefly, yet comprehensively, with this section if one is to do it the justice it undoubtedly deserves. For one thing, the full significance of the majority of the exhibits can only be appreciated by actual inspection, whilst in other cases, by observation of demonstrations. The first sub-section deals with the inspection and testing of non-metallic materials, and various appliances are shown for determining the strength of timber in bending and compression, the brittleness, the moisture content, the properties of ply-wood, etc. A series of samples are shown giving comparisons of good and poor quality timbers under different conditions. Various methods of testing glues and cements, and glued joints form another important and interesting subject. Materials such as fabrics, ropes, and rubber all have to undergo tests for strength, durability, water-tightness, and petrol-resisting qualities, as the case may be, and several methods of achieving this end are displayed. Then there is the testing of petrol and oil for various properties which requires the use of several interesting appliances, whilst the last items in this sub-section—and large ones at that—comprises the testing of dopes, paints and varnishes.

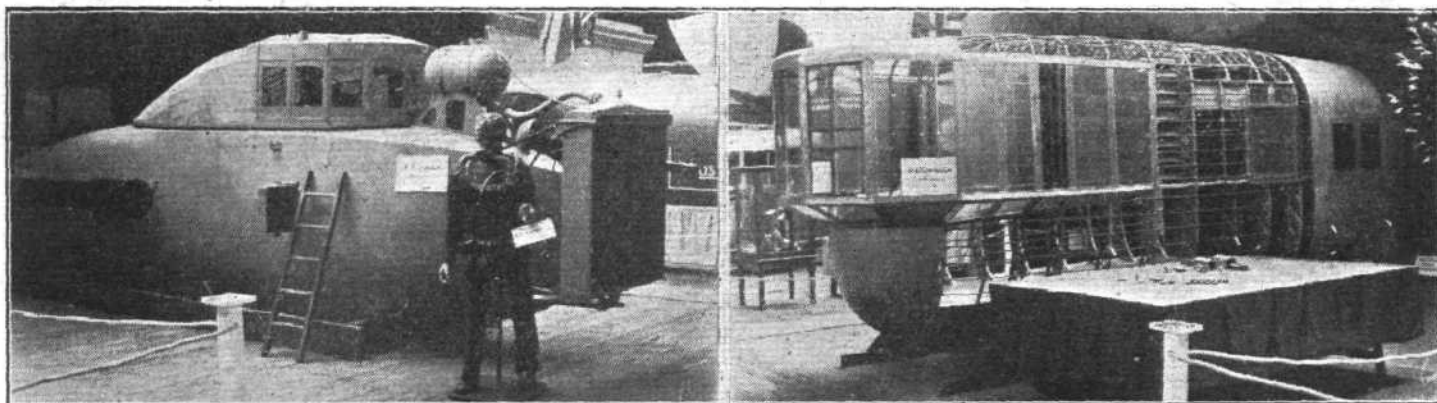
seen: telephone generator (armature losses, insulation, resistance, regulation, etc.), kilowatt spark set (input, output and wave-length), telephone receiver and transmitter (inductance and capacity), and tests on W.T. thermionic valves.

Various types of magnetos may be seen undergoing tests, both electrical and mechanical, in the next section, also armatures, condensers, distributors, sparking plugs, etc. Further along we find carburettors going "through the mill"—master jets calibrated by means of a specially designed flow meter and size of jets checked by similar means; floats and float chambers tested for freedom from porosity.

In the propeller section there is much to be seen, from approved methods of constructions to disapproved ones, together with numerous samples of interesting "defects." Various tests for finished propellers are also demonstrated.

The aero engine inspection and testing section is quite a big affair, as might be supposed, and much of interest may be examined here. Besides many component parts of various types of engines, with jigs and gauges used in checking same, then some interesting machines for such important matters as balancing connecting-rods, rotary engine cylinders and crankcases, measuring the power developed by rotary engines (torque reaction) and the petrol consumption of engine during test (A.I.D. flow meter) and measuring power developed by Heenan & Froude water brake (300 h.p.). An apparatus for testing cylinder water jackets under pressure is also shown.

In the next section is a *fuselage* in skeleton construction in which are shown the methods by which truth of assembly



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AIR MINISTRY AT THE AERO SHOW : Left : Engine car of R.31. Right : Control car of R.37 and a bird's-eye view model of Cardington Airship Station

The next "department" is devoted entirely to the testing treatment, and investigation of metals. Here, in addition to innumerable specimens various kinds of steels and other metals, crankshafts, valves, tubing, bullet-proof steel, showing the troubles experienced in the past and progress made with these materials, one can observe some very interesting demonstrations in the actual testing of materials for tensile strength, torsion, elastic limit, etc. Demonstrations are also given in heat-treatment of metals with an electric muffle furnace.

In the next section will be found some measuring instruments and apparatus used for checking the various gauges employed for inspection purposes. There is also an assortment of these gauges, together with specimens of standard aircraft fittings, on which they are used, showing various defects detected during inspection. Here, also, methods for testing petrol tanks, petrol cocks and radiators are shown.

Next there is the testing of instruments and electrical apparatus. Two of the exhibits here which should not be missed, are one, an X-ray apparatus by means of which it is possible to detect defective workmanship, otherwise not visible to the naked eye, and the second, an apparatus for checking revolution indicators to an accuracy of 1 in 2,500. The feature of this apparatus, which was designed by the Royal Aircraft Establishment, lies in the fact that not only is it possible to check a greater number of instruments as compared with other types previously in use, but the actual process of checking is both simple and without strain upon the eyes of the operator. Air speed indicators, altimeters, and pressure gauges are shown being checked by usual methods, whilst the following tests for wireless apparatus may also be

of the various parts is checked, both as regards relative alignment and interchangeability. A complete machine, under final inspection, illustrates the procedure of ascertaining the c.g. of machine (by weighing it fore and aft), checking dihedral angle, angle of incidence stagger, sweepback (if any), and the correct position of the various other components. This demonstration in rigging is extremely interesting and instructive. In the same section are shown a complete skeleton wing (Avro type) of metal construction, as well as some spars, ribs and struts of metal construction. A seaplane float is also shown, in which the various stages of erection and inspection are displayed. In this connection a demonstration is given of a method of testing for water-tightness by means of a jet of water at high pressure, which is far more reliable than merely filling the float with water.

The last exhibits to which we would draw attention consist of an example of the methods employed in testing to destruction the main plane structure, in one of which the machine, suitably supported, is inverted and the wings loaded with sand bags so as to produce stresses corresponding to those in actual flight. In the other method, for testing the strength of ribs, a short length of plane is constructed, containing the ribs to be tested, and suitably placed in an inverted position, and the loading applied by means of links to represent the forces which are acting on the plane when in normal flight. Deflection during test is measured by scales hanging from the ribs.

In conclusion, we venture to say that if the visitor, especially if of a technical turn of mind, on entering Olympia, goes straight to the Gallery, and "does" that section only, he will more than get his money's worth. In fact, the Air Ministry Section is an Exhibition within an Exhibition.

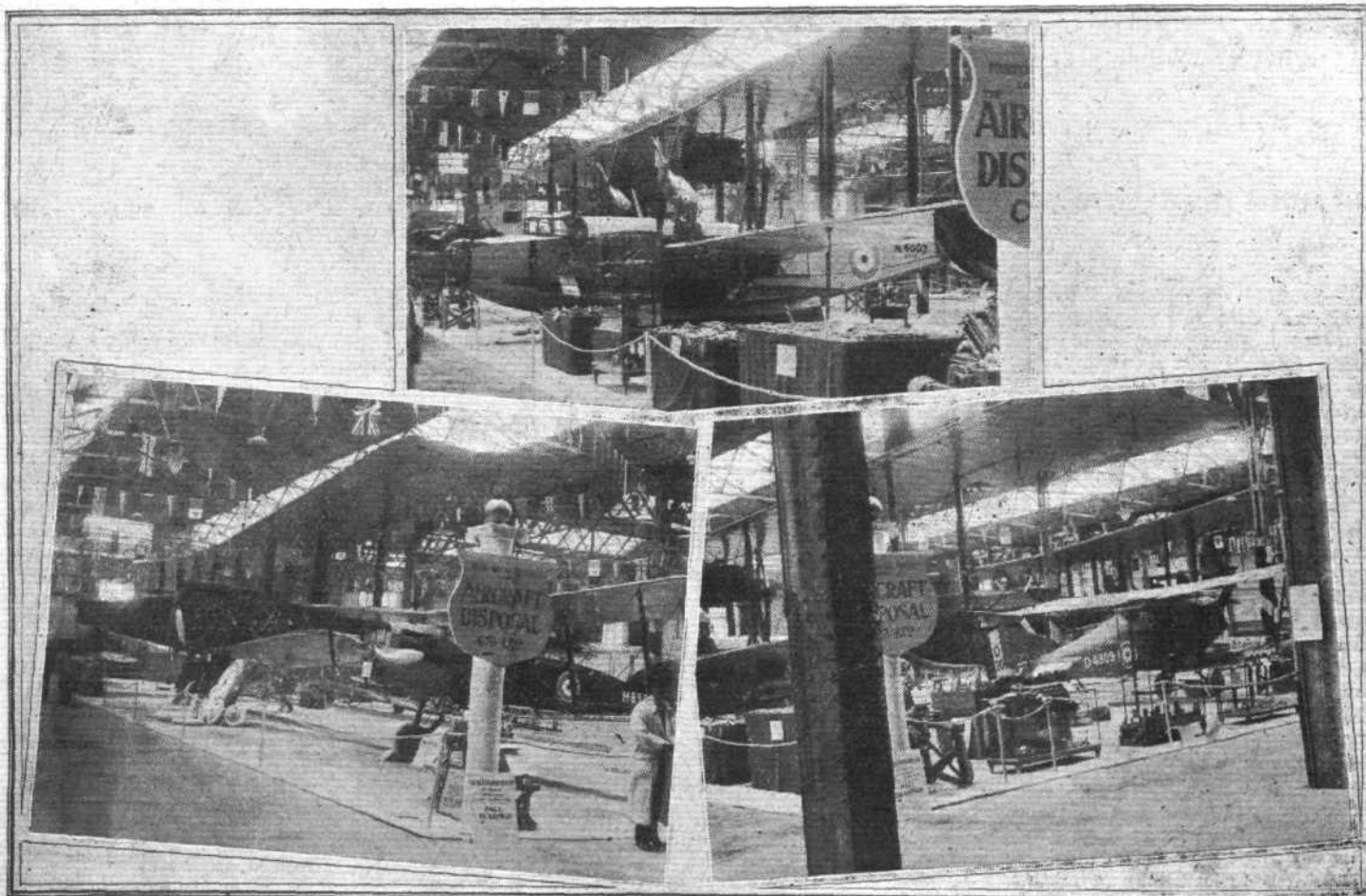
THE AIRCRAFT DISPOSAL CO.'S EXHIBIT

THE "Historical" Exhibit, in the Annexe, which is well worth a visit, comprises some 14 complete aeroplanes, various types of engines, and numerous components, representing the principal types of aircraft used by the Allies during the War. These machines and components have been loaned by the Aircraft Disposal Co., Ltd., for whom Messrs. Handley Page, Ltd., are the sole agents, and are selections from the vast stock of surplus aircraft material purchased some time back from the Government. The machines exhibited are arranged in full war-paint, exactly as they were used on the various battle fronts, and consist of the following types:—Avro 504K, used from start to finish of the War, mainly as a training machine, although several famous bombing raids during the early stages are to its credit. Armstrong-Whitworth F.K.8, with 160 h.p. Beardmore, used in the early stages as a fighting and reconnaissance 'bus. It was on one of these machines that Lieut. A. A. McLeod and Lieut. Hammond had an exciting duel with eight Hun triplanes, when after accounting for three of the latter their machine caught fire and crashed in No Man's Land, whence Lieut. McLeod, though wounded, managed to carry Lieut. Hammond, also wounded, out of danger. Norman Thompson Flying Boat, 2B., with 210 h.p. Wolsley Viper engine, employed as a standard machine for the instruction of flying-boat pilots. D.H.10A with two Liberty engines, used towards the end of the War as a daylight bomber. D.H.4 with 260-h.p. Rolls-Royce Eagle VI, on which type of machine Capt. Cadbury brought down a Zeppelin in the North Sea. D.H.9 with 240-h.p. Siddeley Puma, which made its name and caused much havoc in bombing the Rhine district. S.E. 5A, 210-h.p. Wolsley Viper, on which type many glorious deeds were put up by, amongst many others, the late Maj. J. B. McCudden, V.C., D.S.O., M.C., M.M., the late Capt. A. Ball, V.C., D.S.O., M.C., the late Maj. E. Mannock, V.C., D.S.O., and Lieut.-Col. Bishop, V.C., D.S.O., M.C., who holds the record of 70 enemy machines destroyed. Martinsyde F.4, 300-h.p. Hispano-Suiza, a comparatively recent machine, had the distinction of being the fastest machine in service, and on which Lieut. F. H. McNamara, V.C., of the Australian Squadron made his name. F.3 flying boat,

with two Rolls-Royce Eagle VIII engines was developed at Felixstowe Air Station under the late Col. J. C. Porte, and did much valuable service in conjunction with the fleet. Bristol Fighter, 300 h.p. Hispano-Suiza, a highly successful fighting and bombing machine on which the late Capt. W. Leefe Robinson, V.C., and the late Lieut. Hawker, V.C., executed many of their valiant deeds. F.E.2b, 160 h.p. Beardmore, one of the earlier pusher gun 'buses, which also made many "hits" as a night bomber. Sopwith Snipe, with 230-h.p. B.R.2 engine, recalls a magnificent episode of the War, when Lieut.-Col. W. G. Barker, V.C., D.S.O., M.C., put up a gallant fight against nearly 50 Hun machines and, although severely wounded in the legs and left elbow, succeeded in destroying four. Handley-Page, 0.400, two Rolls-Royce Eagle VIII engines, the father of giant bombers, needs no comment here on its good work during the War. Vickers-Vimy bomber, two Rolls-Royce Eagle VIII engines, is another large machine that helped the War on to a successful conclusion.

A representative display of engines, and engine parts, is also to be seen, including B.R., Clerget, Le Rhone, and Gnome (mono) rotary types, and Rolls-Royce, Berliet, F.I.A.T., R.A.F. Sunbeam (Arab and Dyak), Siddeley (Puma), Hispano-Suiza, and Wolsley. A large assortment of accessories and equipment completes this interesting section.

We might add, in conclusion, that this exhibit is not merely ornamental, but serves a useful purpose in indicating that immediate facilities are available for developing civil aviation, as it must be remembered that these machines represent single specimens of a large stock now held by the A.D.C. of machines that can be adapted to suit a variety of requirements. We understand that the Aircraft Disposal Co. are prepared to carry out alterations and conversions to any of these machines according to requirements. For instance, the Avros may be converted into very successful commercial passenger planes, or fitted with the 80 h.p. R.A.F. engines which turns the machine into a reliable touring machine with a petrol consumption no more than that of a motor-car. The Bristol Fighters also make useful passenger and mail carrying machines.



The Aircraft Disposal Company's Exhibit at [the Aero Show, Olympia: Top: Showing a few fittings and the F 3 flying-boat. Left: A Bristol Fighter and Handley Page Bomber. Right: Some "parts" and the Martinsyde F 4

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AERO ACCESSORIES AT OLYMPIA

Aerofilms, Ltd., London Aerodrome, Hendon. (STAND 4)

THIS firm have on view a large number of photographs of factories, works and other views taken from the air. Another section of their stand deals with aerial cinematography, from the point of view of the aircraft manufacturer. They claim that new types of machines, when filmed in the air during their experimental and test

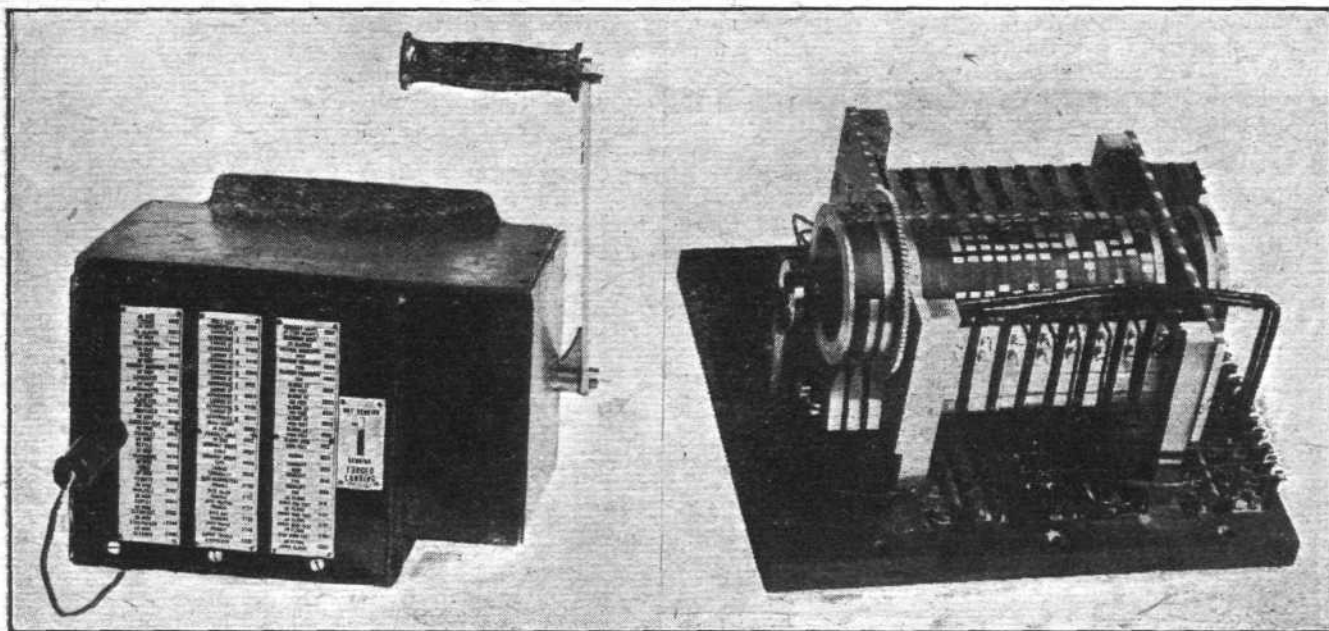
of photographs from the air, of factories, railways, docks, country estates, etc.

The Anglo-American Oil Co., Ltd., 36, Queen Anne's Gate, S.W. 1. (STAND 12)

HERE are shown all grades of petroleum spirits, including "Pratt's" Aviation, "Pratt's" Perfection, and "Anglo's" Taxibus. There are also

The Automatic Telegraph Co., 132, Charing Cross Road, W.C. 2. (STAND 32)

THE "One-Lever" Automatic Telegraph for use on aircraft is the feature on this stand. It is an instrument designed particularly to allow pilots of aircraft to transmit a definite message with a minimum of time and trouble. By merely inserting a plug in the proper socket and depress-



The Automatic Telegraph Company's instrument for sending messages automatically. On the left the instrument complete and on the right "the works"

flights, should provide information of assistance in the future development of aircraft, by indicating where improvements can be effected. There is also a large selection of aerial photographic enlargements for sale.

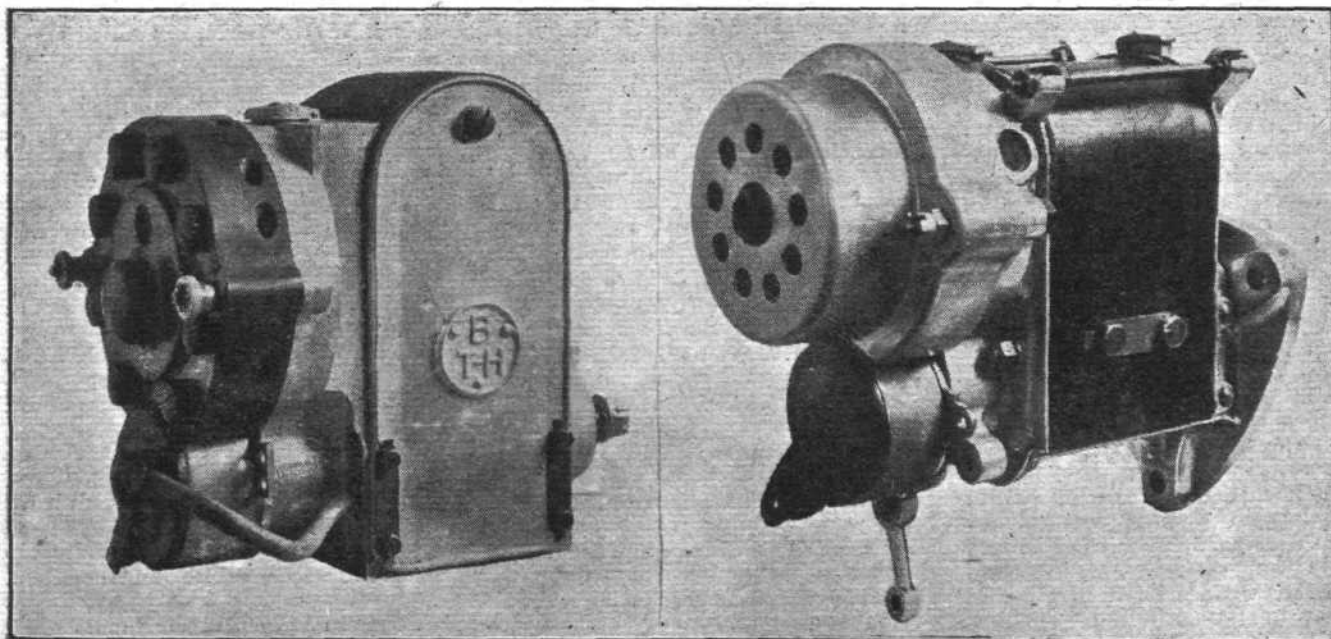
Aircraft Manufacturing Co., Hendon, N.W. 9. (STAND 23)

THIS exhibit is made by the Aerial Photographic Department, and demonstrates the possibilities and value

on view samples of Vapourising and lubricating oils.

An interesting feature is one of the Company's bulk storage outfits, which are creating so much attention at the present time. This system consists of an underground storage tank connected with a self-measuring pump. A quantity of interesting literature on oil and spirit is available.

ing a handle, the message is automatically sent by wireless. There are 60 signals, each consisting of call-sign message and repeats, the message part of the signal being in code and standardised. As will be seen from the photograph, the messages are arranged in three columns, and against each one there is a plug hole. The instrument can be purchased outright, or hired on a maintenance agreement.



Two B.T.H. polar inductor type magnetos: On the left the A.V.8, and on the right the A.O.9 for nine-cylinder engines

The Bournemouth Aviation Co., Ltd., Aerodrome, Ensbury Park, Bournemouth. (STAND 37)

ON this stand is found literature advertising the Bournemouth School of Flying, etc., together with a number of interesting photographs. Particulars will also be available regarding the firm's arrangements for commercial flying, joy rides, etc.

British Cellulose and Chemical Manufacturing Co., Ltd., 8, Waterloo Place, S.W. 1. (STAND 25)

THERE is an array of specimens of cellulose, acetates, and bye-products on view, as well as samples of Government and Novellon dope. Those who are technically interested will be able to make comparisons between specimens of doped fabric on frames executed to approved doping schemes. Another item will be an explanatory chart showing the stages in the manufacture of cellulose acetate, with specimens of raw materials, etc.

The British Thomson-Houston Co., Ltd., Rugby. (STAND 6)

ON this stand are seen several patterns of the polar inductor type magnetos for aircraft work. The A.V. 12 type was used on the airship R. 34, which made the double crossing of the Atlantic. This type was developed originally for use on the 9-cyl. radial-engine of the Dragonfly type, and it has also demonstrated its efficiency on the Jupiter 9-cyl. engine. Like the A.V. magneto, it is of the polar inductor type, provided with a standard armature and condenser, the straight-through, non-magnetic steering shaft carrying a rotating member to which four iron inductors are attached.

The British Wright Co., 9, Galen Place, Bury Street, W.C. 1. (STAND 83)

ONE of the most interesting of the many instruments on view here is the Darwin turn indicator, invented by Sir Horace Darwin. It consists of two static tubes situated respectively

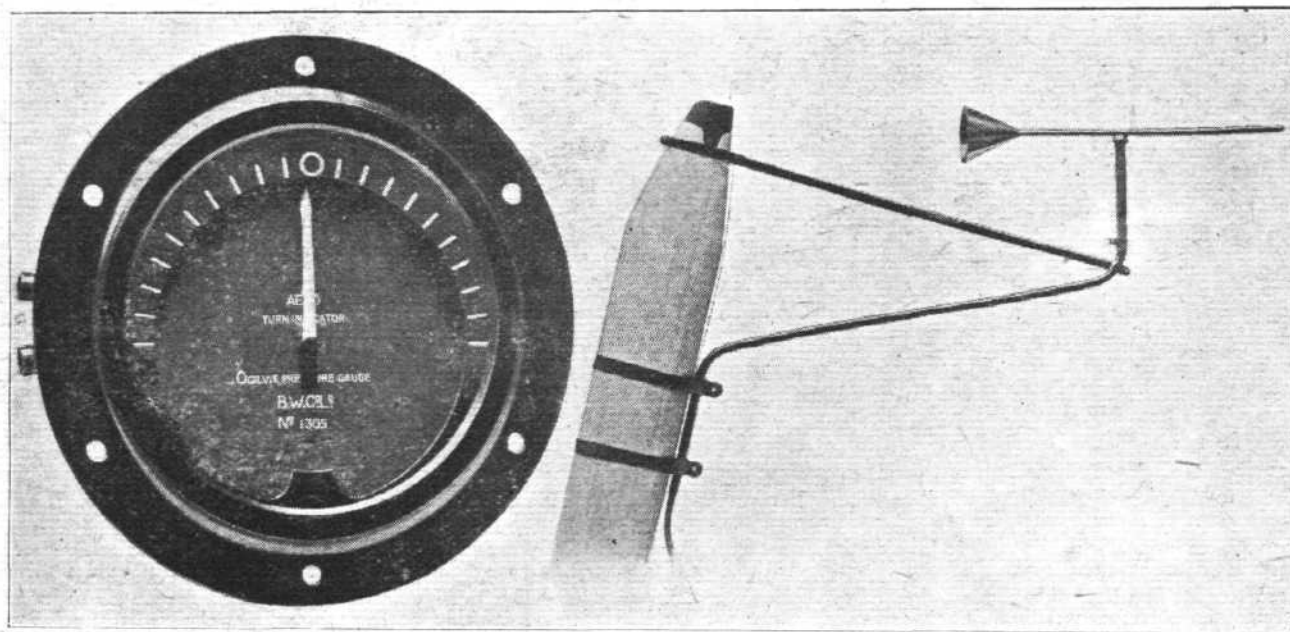
telegraphs, tension meters, radiator thermometers, oil and air pressure gauges, moisture testing sets, lighting dynamos, lamps, sparking plugs, pumps of various types, parachutes, propellers, petrol taps and unions, celluloid liquid glue, shock-absorbers, and last, but not least, mascots in considerable variety.

Bullivant and Co., 72, Mark Lane, E.C. (STAND 18)

THIS firm are exhibiting their specialities in the form of round steel wire cords, flat steel wire ropes, and round steel wire strands for aircraft, as well as ropes and cords for constructional purposes, slings and gears for lifting, etc. They are making a feature of the aeroplane control cable which has been so generally used on War machines. It is a four-stranded cable, of which some 8,383,000 ft. have been produced.

Bruntons, Musselburgh, Scotland. (STAND 28)

SAMPLES are shown of streamline wires, tie rods, universal and plain



The Darwin turn indicator, made by the British Wright Co. On the left the Ogilvie pressure gauge which indicates the turn, and on the right, one of the swivelling static tubes

The British Emaillite Co., 5, Hythe Road, Cumberland Park, Willesden. (STAND 76)

THE various stages of the three Emaillite doping schemes, "X" for use on aeroplanes and seaplanes and tropical service, "B" for use on standard type aeroplanes, and "S-M" for use on aircraft for school and training purposes, are shown together with the Emaillite airship doping scheme "P," as used on the R. 34, and it is claimed that it is still unsurpassed, weight for weight.

Among the protective materials for aircraft on view are the T.O.V. transparent; P.O.V. khaki, red, white, blue and black; varnish for internal woodwork; varnish for external woodwork; air-drying black enamel; battleship grey; white dope resisting paint; transparent wood filler; paints for motor transport vehicles; and Emaillite superfine varnishes and enamels for the interior decoration of aeroplanes and airships, cabins, saloons, etc.

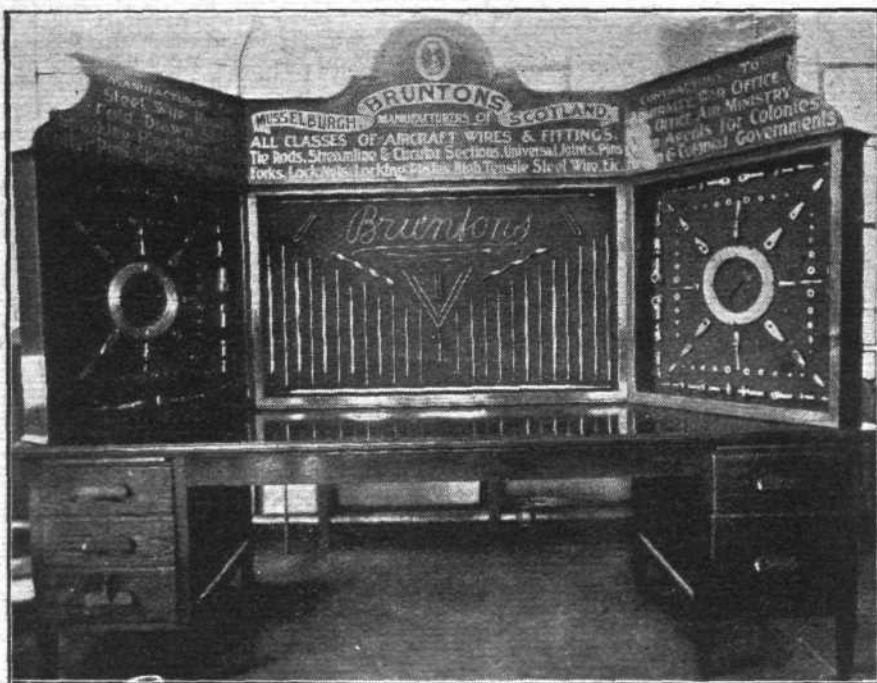
Other exhibits include: G.A.C. aero propellers, G.A.C. aero components, G.A.C. aeronautical instruments.

on the port and starboard extensions of the wings, with an Ogilvie pressure gauge mounted in front of the pilot. By this combination the hand of the gauge is caused to point to right or left, showing the direction in which the aircraft will turn. Each static head is free to swivel in all directions, so as to adjust itself by reason of its wind-vane, and maintain its alignment with the varying direction of the wind.

Brown Brothers, Ltd., Great Eastern Street, E.C. 2. (STAND 7)

"SOMETHING for everybody" might be the motto for this stand, which has on it a most comprehensive display of accessories, fittings, instruments and appliances having some connection, close or remote, with aeronautics. There is electrically-heated clothing, various patterns of helmets, goggles, safety belts, etc. steering wheels, levers and other control mechanisms and carburettors, while among the instruments may be mentioned aneroids, air speed indicators, air release valves, compasses, levels, pressure gauges, switches, revolution counters, volt and ampere meters, Abney levels, incidence gauges, airship

fork joints, "Army" and "Admiralty" types; also Bruntons' own "B.R." universal fork, a lighter design than the "Army" type, which is intended as an alternative; also, turnions, lock-nuts, pins, locking plates, turnbuckles and steel wire cable for airships and aeroplanes; wire spokes, sparking plug parts, etc. It is claimed that among the advantages of "Streamline" wires and tie rods of high strain with screwed ends for exterior and interior bracing of aircraft are: The wind resistance is considerably less than that of a cable suitable for carrying the same load. The increased speed when flying, as compared with cables, is estimated at 7 to 15 m.p.h. when flying at or about 100 m.p.h. The stretch of "Streamline" wires is less than that of cables subjected to the same working load. The adjustment is much greater than can be obtained on cables, and can be more readily and speedily fitted by an ordinary rigger or mechanic. Some of the exhibits are covered with anti-corrosion coatings by "Bruntonising," electro-galvanising, cosletising or electro-plating. All classes of high-



A cabinet display of some of Brunton products

grade steel wire for wire rope; bright drawn bars, squares, rounds, hexagons, to aircraft specification; silver steel and high-speed steel for twist drills and small tools; armature binding wire, electrical resistance wire, music wire, turbine blading, etc.

Cellon (Richmond), Ltd., 22, Cork Street, London, W. 1. (STAND 82)
SINCE it was placed on the market

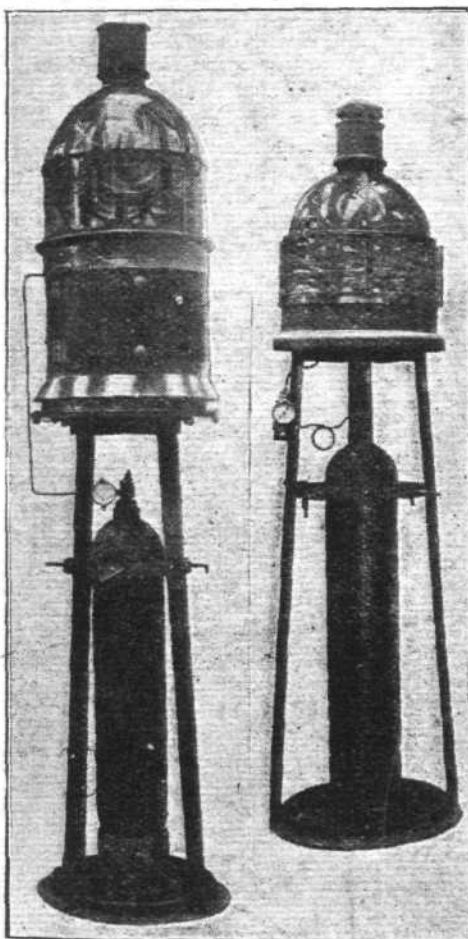
in this country in 1911, Cellon dope has made great strides in popularity, and the demand has steadily increased. During the War, considerable progress was made in the direction of pigmented dope coverings to eliminate the effects of ultra-violet rays, and it is stated that the output of these products for War purposes was well over a million gallons. On this stand are found particulars of the two doping schemes: A, which is specially suitable for aeroplanes and flying boats, and B, a pigmented dope which can be obtained in all colours. There are also exhibited on this stand some Cellon developments in the shape of solutions for wood (to replace French polish), for metal (in the form of lacquer), and for leather, paper, etc.

Chance Brothers and Co., Ltd., Lighthouse Works, Smethwick, Birmingham. (STAND 79)

This firm are exhibiting two lighthouses for aerial navigation, one of the revolving type using dissolved acetylene as illuminant and giving one flash every five seconds.

This is similar to a small sea light, but has special top lenses to throw the light upwards, and the beam can be seen by an approaching aeroplane from a distance of, say, 20 miles on a clear night until right over the light. This light can be left unattended during the night.

The other lighthouse is of the fixed lens type, giving flashes by means of automatic mechanism, one second light, four seconds dark. The bottom half of the lens is similar to a sea light, and the upper half is omitted so that when at a certain angle above the horizontal the light from the naked flame is seen. It is less powerful than No. 1. This light can be left entirely unattended for long periods. Dioptric lenses of 300 mm. and 200 mm. diameter, as used in small lights, will also be shown, as well as an oxy-acetylene searchlight, 20 ins. diameter. The last-mentioned can be used as a landing light or for any other purpose where a strong illuminant is required. It is entirely self-contained and portable.



Two Lighthouses by Chance Brothers: On the left the revolving type giving a powerful flash every 5 seconds and on the right a fixed light, with automatic flashing device

Falcon Airscrew Co., and D. M. Davies, 113, Cottenham Road, London, N. 19. (STAND 29)

Two- and four-bladed aeroplane propellers, showing various stages of manufacture, are on view, as well as a wide range of standard propellers suitable for many well-known makes of engines. They are seen in a variety of patterns—ordinary, fabric-tipped, fabric-covered, brass-tipped and copper-tipped.

Thos. Firth and Sons, Ltd., Sheffield. (STAND 40)

ON this stand is seen a full range of those of their products which apply to the aircraft industry. Of, perhaps, principal importance are stampings, bars, sheets, test pieces, bends, etc., in carbon, nickel, chrome vanadium and nickel chrome steels, the latter for both oil and air hardening. In the same category must be included stainless steel, which will be also shown in many forms, including a representative selection of parts and articles made from it.

"B.N.D." and other stampings in alloy steels are presented by a display of connecting rods, valves, gear blanks and other aero-engine parts, whilst the Derihon method of stamping to obtain maximum strength in the part, through correct disposal of the grain of the steel, is exemplified by several extremely interesting etched sections. Samples are also shown of "B.N.D." stampings which have been submitted to bending and other destructive tests.

Gas Accumulator Co. (U.K.), Ltd., Beacon Works, Brentford, Middx. (STAND 68)

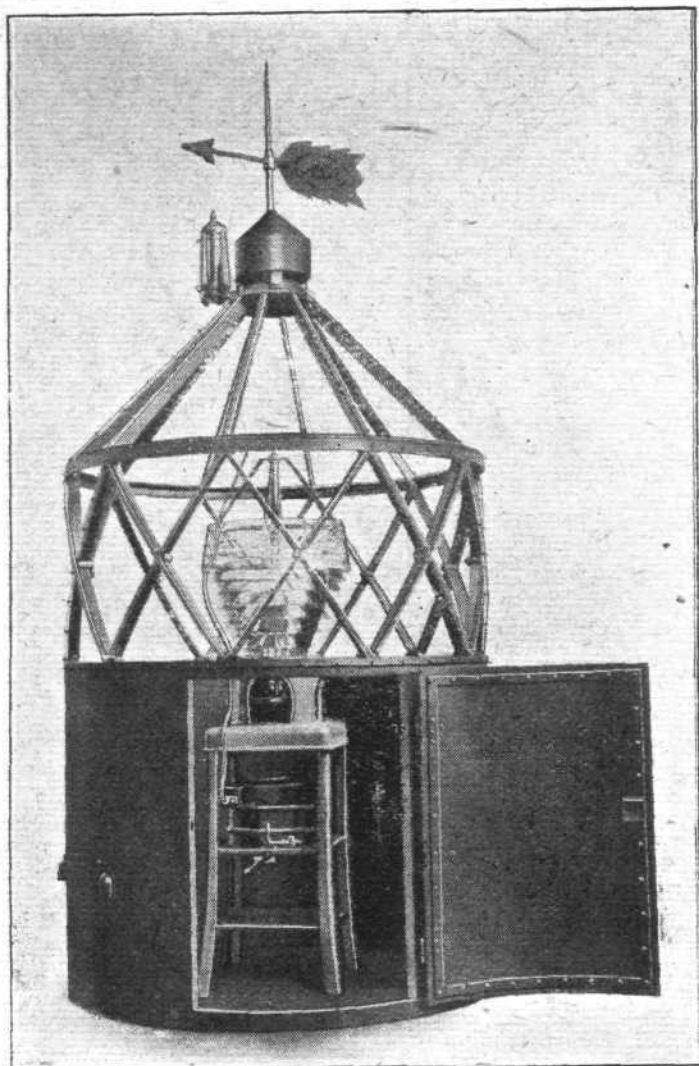
THREE examples of the aerial lighthouses produced by this firm are on view, a high-power, a medium-power, and a low-power light. These lighthouses are the result of the experience gained by the firm with their A.G.A. Marine Light Signalling system, and the outstanding characteristic of the system is its absolute automaticity, including lighting, extinction, maintenance, etc. It was during 1913 that the first A.G.A. Aeronautical Signal Light was produced, and in construction it followed the lines of the well-known A.G.A. Lighthouse apparatus which is used by many of the principal port authorities of the world, including Trinity House, London. Another development to be seen on the stand is the adaption of existing light-buoys for aerial work.

The General Accident, Fire and Life Assurance Corporation, Ltd., General Buildings, Aldwych. (STAND 33)

FOR the purpose of aviation insurance in all its branches. Policies are issued for the following risks: Accidental damage to machines, fire, burglary and theft, third party, legal liability to passengers, pilots' personal accident, passengers' personal accident, cargo, wind, storm and tempest, riots and civil commotions, salvage and abandonment of machines, mechanical breakages and breakdowns, employers' liability to mechanics.

Glacier Metal Co., Ltd., Waldo Road, Willesden Junction, N.W.10. (STAND 72)

BEING manufacturers only of metals and bearings, their exhibit at the Aero Show is confined to their Findlay's special motor metal, for bearings of



One of the Aerial lighthouses made by the Gas Accumulator Co.

internal-combustion engines, Babbitt metals of various grades, solid die cast bearings and bushes, and gun-metal white metal lined bearings.

Hadfields, Ltd., Tinsley, Sheffield.
(STAND 92)

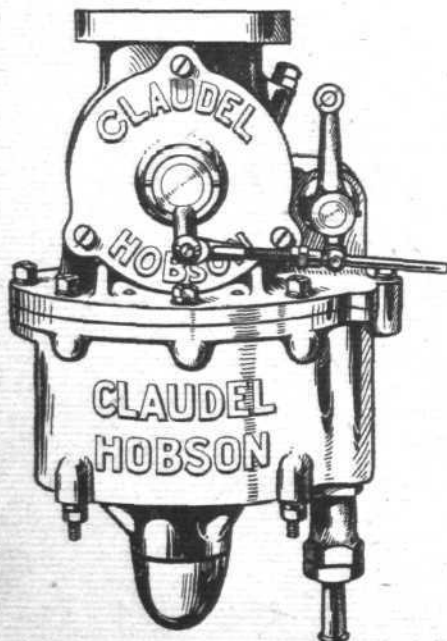
STEELS for a great variety of purposes are on view, as well as one or two representative drop stampings of Hecla and Era steels. An exhibit which will appeal to many is

a chisel of "Hecla 18" steel, driven through an iron block over 1 in. thick, while others will find their attention centred on a Guillery shock testing machine for the purpose of demonstrating the toughness and brittleness of steels.

H. M. Hobson, Ltd., 29, Vauxhall Bridge Road, S.W. 1. (STAND 89)

AVIATION accentuates the problem of carburettor design to the highest point. Absolute reliability is vital. Speed and climb are two of the most essential factors, and fuel economy is nearly as important. The four-engined aeroplane of the bombing or cargo-carrying type will consume almost 80 gallons of petrol per hour, and must carry several tons of petrol for a long flight. Therefore, carburettors which reduce the fuel consumption by even 5 per cent. permit of a large addition to the useful load. From August, 1914, up to the Armistice, Claudel-Hobson Carburettors were produced and supplied for aviation engines of various types, developing over 10,000,000 h.p.

It is needless to add that the firm are now applying to commercial aviation the experience gained during the War period. They maintain the closest possible touch with current developments in aviation, and are in a position to supply carburettors suitable for any type of stationary aero engine. During the War, all records for height, speed, weight carrying and distance were made by aeroplanes, the engines of which were fitted with Claudel-Hobson



The Claudel-Hobson carburettor.

carburettors, and since the Armistice these carburettors were used:

On the first direct Trans-Atlantic flight—Vickers-Vimy Rolls-Royce engines; H.M.A. R34, England-America-England—Sunbeam-Coat-alen engines; London to Australia—Vickers-Vimy Rolls-Royce engines; London to Madrid—Alliance Napier "Lion" engines.

Claudel-Hobson carburettors are standardised on following aero engines: Rolls-Royce: "Hawk," "Falcon," "Eagle" (Mark 1 to Mark 8). "RAF 1A," "RAF 2A," "RAF 3A," "RAF 4A." Sunbeam-Coat-alen: "Arab," "Maori," "Cossack," "Matabele," "Sikh," "Dyak," Napier, Cosmos, "Jupiter," 400 h.p. "Liberty" Aero Engine. 70 h.p. and 85 Renault engine. A.B.C.: "Wasp," "Dragon-fly." Siddeley-Deasy: "Puma," "Tiger." Beardmore: "Atlantic," "Pacific." Also various Claudel-Hobson aero carburettors.

The Hoyt Metal Co., of Great Britain, Ltd., 105, Deodar Road, Putney, S.W. 15. (STAND 27)

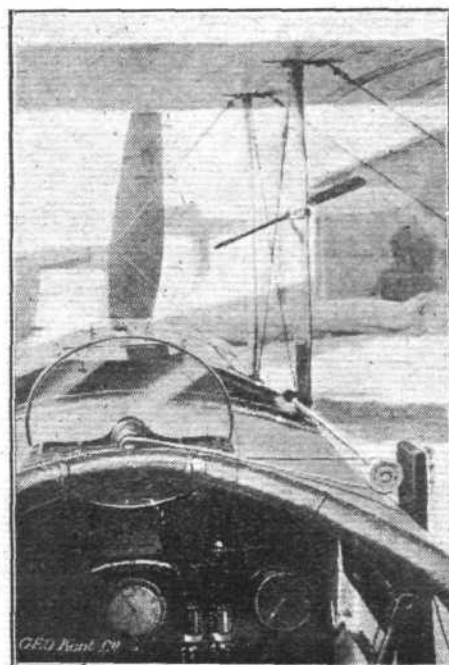
Show their standard brands of Babbitt (or anti-friction metal), also a selection of die-cast bearings.

The manufacturers state that their Number Eleven Alloy is now in use by a considerable number of the best British and Continental motor-car manufacturers. Nearly 800 tons of Number Eleven Alloy was supplied in 1918 for aviation engines alone. In addition, there was at the time of the Armistice a further 950 tons on order, making a grand total of orders received in 1918 alone of 1,750 tons.

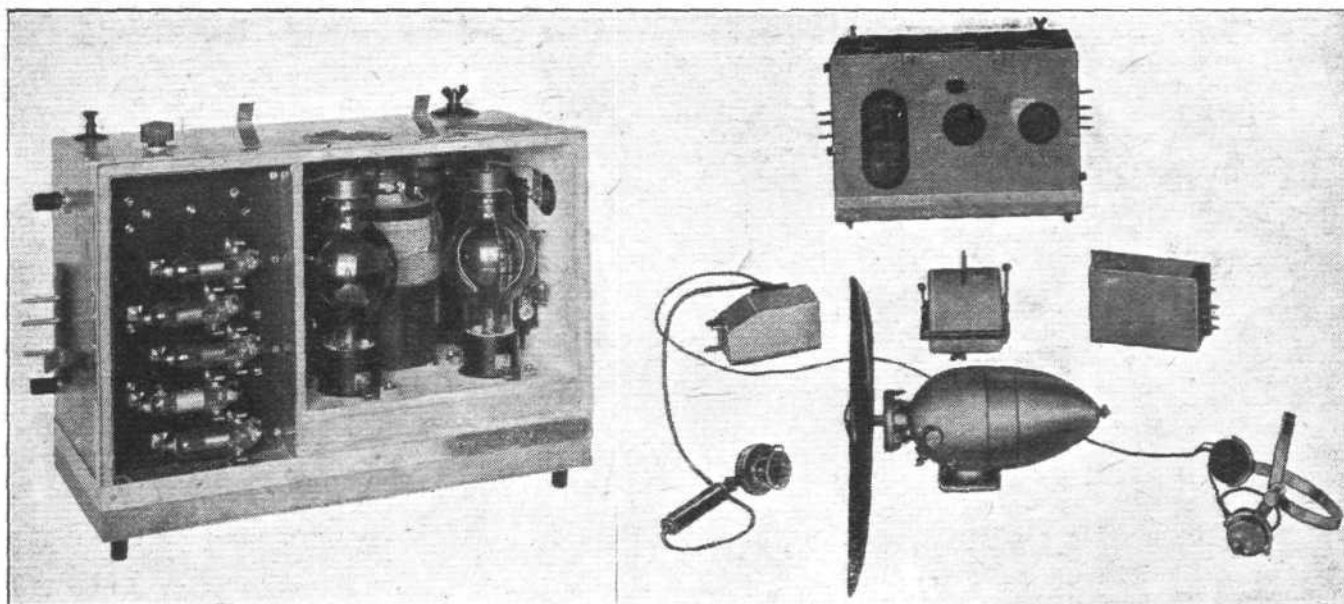
Hoyt die-cast bearings in Number Eleven Alloy will be shown, of which several thousand complete engine sets were supplied for well-known high-powered engines.

George Kent, Ltd., 199-201, High Holborn, W.C. 1. (STAND 1)

THE feature on this stand is the Clear View Screen, an ingenious and simple invention which enables a clear



The "Clear Vision" windscreen, made by George Kent, Ltd., which is kept clear by being rotated through the medium of the little airscrew on the strut



The Marconi aircraft wireless telephone : On the right the complete set and on the left the transmitter and receiver box

look-out to be maintained in rainy or snowy weather, and also prevents the screen becoming splashed by oil thrown from the engine. It consists of a rotating glass disc driven at a suitable speed either by a belt from a small windmill fitted to one of the struts, or by means of vanes ranged the periphery of the glass disc. The lower half of the screen is carried in a light aluminium trough which protects it and also catches the water which is drained off. In the type which has the vanes round the screen, a brake is fitted to hold the disc from rotating when flying in fine clear weather.

Marconi Wireless Telegraph Co., Ltd., Marconi House, Strand, W.C. 2. (STAND 8)

OF the many interesting things to be seen on this stand one of the most popular is the wireless telephone set for aircraft. The set has been primarily designed for wireless inter-communication, whether telegraphic or telephonic, between aircraft and ground stations, or to other aircraft. The chief characteristic of the set is that it combines in one box both transmitter and receiver, connected permanently by cables to a small unit which carries all the handles necessary for control of the set. This small unit, called the remote control, can be mounted conveniently to the hand of the user, while the set proper can be stowed away permanently in the most convenient position. The principle of remote control enables a pilot, while flying, to have all the necessary adjustments for both sending and receiving either telegraphy or telephony in a very compact space.

Metal Airscrew Co., Ltd., Regent House, Kingsway, W.C. 2. (STAND 80A)

THE "Leitner-Watts" Metal Propellers shown are primarily constructed of mild steel sheets and adapted to fit direct on to an engine shaft by means of a steel forging. Two methods are employed in the construction. The first method is that in which the steel sheets are continuous from tip to tip each forming the "face" on one side of the hub (which is the forging), and the back of the propeller

on the other, and this method is confined to two-bladed propellers only. The second and latest method, is that in which the blades are separate. They are shaped from the true aerofoil section to a cylindrical section at the root; the

North and Sons, Ltd., 14, Soho Square, W. 1. (STAND 85)

ON this stand is found a comprehensive exhibit of Watford Magnetos and Watford Revolution Indicators for Aircraft engines.



A Leitner-Watts Metal Propeller fitted to an Avro

blades thus formed are held in a steel hub. The hub is forged or stamped in two halves and forms sockets to take two, three or four blades. The cylindrical form of the root of each blade enables it to be rotated on its own axis, thus making it possible to vary and adjust its pitch.

Northern Engineers' Supply Co., John Street, Sheffield. (STAND 36)

THIS firm is showing spare parts for a large number of aero engines, including Rhone, Clerget, Siddeley-Puma, Hispano-Suiza, Sunbeam. Tool kits and tools for rigging, etc., are also displayed.

Messrs. W. D. Oddy and Co., Ltd.,
Leeds. (STAND 80)

A VERY representative collection of propellers make up the exhibit on this stand. Having confined their attentions solely to propellers this firm have steadfastly refused to be drawn aside by the more profitable post-War activities, and have re-organised their works to meet the changed circumstances that peace has brought about.

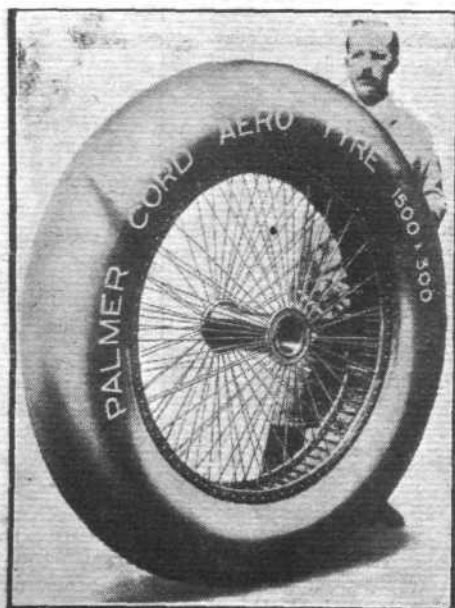
One type shown, of their own design, of particular interest, is that of the Rigid Airship R.38. This propeller is one of those specially designed in view of the proposed Trans-Atlantic flight of this ship, and has a number of interesting features, one of them being a lightning conductor connected to the metal tip and leading directly to the engine boss. The propeller is built solely of Honduras mahogany, and is 17 ft. 6 ins. from tip to tip, probably one of the largest in existence.

Another interesting propeller is the two-blader designed for the Alliance-Napier "Seabird," and which drove it on the famous non-stop flight from London to Madrid in 7½ hours. This design awakened a good deal of interest at the time, and Messrs. Oddy are expecting big things from it in the future. A second Napier "Lion" airscrew exhibited is a four-blader made for a very different type of craft, being designed from the Hon. A. E. Guinness's coastal motor boat "Oma." Messrs. Oddy have in hand other aerial propellers for water-borne craft, and anticipate considerable developments in this direction.

A propeller still in the experimental stage is the recently patented adjustable and reversible one. It is aimed with this to alter the pitch of the airscrew whilst in flight, a privilege that will appeal at once to every pilot. If time permits a working model will be placed on the stand.

Joseph Owen and Sons, Ltd., 199a, Borough High Street, London, S.E. 1. (STAND 14)

THIS firm are exhibiting all classes of timber suitable for aircraft construction, including coppice-grown



A giant Palmer aero tyre

English ash, prime clear silver spruce, mahogany and walnut for propellers, etc., American rock elm, cottonwood, cypress and canary whitewood, cedar panels, and 3-ply panels, etc.

Palmer Tyre, Ltd., 119-123, Shaftesbury Avenue, W.C. 2. (STAND 15)

As might be expected of a house having such an exceptional record, the Palmer Tyre, Ltd., are making an extensive display of landing wheels and tyres on their stand, and a characteristic exhibit is the electrically driven tyre-making machine as used in the making of Palmer tyre aeroplane tyres. The wheels and tyres on view range from 300 mm. by 60 mm. to 1,750 mm. by 300 mm. There is seen also a selection of Palmer aeroplane tyre accessories, wheel components and wheel rims. Visitors are able to obtain a souvenir booklet, "A Record of Success," with reproductions of some clever water-colour drawings by Mr. Geoffrey Watson.



Front and back views of the Parnacott sparking plug tester

The Palnut Co., Ltd., 6, Great St. Helens, E.C. 3. (STAND 86)

THE Palnut is a safety lock washer in the form of a steel stamping, which is dished or coned engaging in a single thread of the bolt. The washer in varying dimensions is a running fit over and above the tolerances established for the thread to which it is adapted, and one of the hexagons is raised to conform to the chamfer of the same. When the nut has been sent home the washer is spun down to contact with the nut, two threads sufficing to effect the purpose, and then a half-turn given the washer with a suitable spanner. The effect produced is that the hexagon flats are pressed tightly and cumulatively into the base of the pitch of the thread. This pressure is merely intensified by excessive vibration.

A. E. Parnacott, Penge Lane, S.E. 20. (STAND 34)

ONE of the things on view is the sparking-plug tester, designed for the R.A.F. technical staff for demonstrating the gas tightness and sparking qualities of ignition plugs under pressure. It can test simultaneously four plugs under a pressure up to 150 lbs. per square inch. It consists of a cast-iron base and chamber into which the plugs are screwed, pump, magneto and gauge. The chamber has a glass face to show the sparking points. A patent leak detector is supplied which instantly shows if the plug leaks air. This leak detector is a

tube which slips over a plug and makes an airtight joint around same. The other end is closed excepting for a small hole on the top of a convex face on which rests a glass disc. Between this face and the glass disc a drop of oil is placed, and bubbles appear and indicate a leak. Another thing will be an electric cable terminal, which is claimed to be simple in construction more easily fitted, safer, and of longer life than other types. It is readily fitted without the use of tools, and once in position it will not pull off. Other specialities on view are the flexible pipe joint, petrol-cock, which has no rubbing parts, balloon winch cut-out, parachute hook attachment and quick release gear, piston-rings, valve-rocker and other engine parts, the Collins sparking plug, etc.

Pettett's Patent Safety Filler Co., West Pier, Brighton. (STAND 75)

THE use of Pettett's petrol filler makes it practically impossible to overfill the tank, as the petrol is automatically cut off when it reaches the

desired level, while the filter prevents water or foreign matter reaching the carburettor.

Price's Co., Ltd., Battersea, S.W. 11. (STAND 5)

THIS firm are showing samples of their Aero-Castor and Motorine Oils as supplied for lubricating the various makes of aero engines. There is on view, also, samples of their solidified oil—Belmoline—for hot water pumps, screw-down grease-cups, etc., and gears and ball bearings ;



An Oleo Aero Plug: No. 68, for radial and rotary engines

and Battersea and Amber gear oils for gear-boxes, bevel-driven gears and worm drives.

Ripaults, 11, King's Road, St. Pancras, N.W.1. (STAND 31)

ON this stand is a display of Oleo ignition plugs, especially those which have been specially produced for aviation work. The three aviation plugs are now known as Nos. 78, 67B and 68. The first-named is for stationary engines, and has a body of brass highly machined for cooling, the insulation of large-diameter mica. It weighs $3\frac{1}{2}$ oz. The 67B has been designed to meet the requirements of high-efficiency rotary engines. Its extremely short and light body and short overall length eliminate any tendency to cylinder distortion, or distortion of the plug itself. The insulator is a gas-tight taper fit, automatically tightening under centrifugal force. The steel body is specially drilled for cooling, and offers minimum resistance. Weight, $1\frac{1}{2}$ oz. The 68 is designed for use on either rotary or radial engines, and is similar in its construction to No. 67B, with the exception that the body is longer and machined to give extra cooling for radial work. Weight, 3 oz.

The Robinhood Engineering Works, Ltd., Putney Vale, London, S.W.15. (STAND 98)

BOTH "K.L.G." plugs and "K.L.G." precision tools are exhibited, as well as some of the actual plugs used by Mr. H. Hawker for his famous transatlantic flight attempt—the plugs, by the by, having been recovered from the Atlantic. Replicas of the various types of "K.L.G." plugs used in the engines of the machines which achieved the Atlantic flight—the flight to Australia and the Cape to Cairo flight are shown, and there is also on view similar plugs to those which were used in the five Sunbeam-Coatalen Maori engines of H.M. airship for its double journey across the Atlantic. Appealing to the popular mind are some specially prepared sections of various types of aero plugs, including those of the most recent design, specially mounted and arranged with a lighting effect which shows the composition of the insulation in an entirely novel manner.

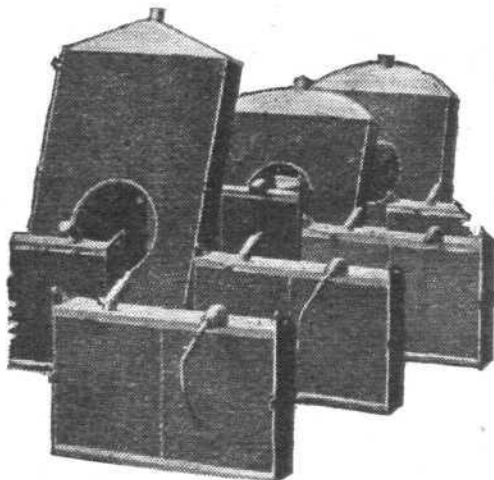
Rubery Owen and Co., Darlaston, Staffs. (STAND 81)

AMONG the exhibits on this stand are Rubery Owen and Co.'s patent release gears, Foxe's patent wire-bending pliers, metric turnbuckles, Wiley's patent parallel jaw hand vice,

A.G.S. special turnbuckles, ordinary turnbuckles, eye-bolt and nuts, all-steel turnbuckles, Hex. Rd Hex. bolts and nuts, special bolts and nuts, special small parts turned from the bar, engine bearers and other pressed steel parts for aeroplanes, all-steel spars and struts, all-steel propeller made-up in layers of sheet steel, corrugated sections for spars and struts in special high tensile steel, sketches of sections herewith.

Serck Radiators, Ltd., Greet, Birmingham. (STAND 30)

ON this stand is found an interesting display of aeroplane and airship radiators, also brass and copper tubes manufactured by the firm. The works are self-contained, manufacturing the whole of the radiator from the tube upwards, and at the present time experiments are being carried



Group of Serck aeroplane radiators

out in connection with the manufacture of oil coolers for airships. The large tube mill erected by the Government during their occupation is now being opened to facilitate increased production. In addition to the round honeycomb tube, Serck, Ltd., are in a position to supply light gauge tubing for other purposes.

Shell Marketing Co., Ltd., 39-41, Parker Street, W.C. 2. (STAND 96.)

SHELL Spirit in the familiar red cans, Shell Aviation in the gold cans, typifying the incomparable quality of the spirit, and grey cans for the commercial grade of Shell (sold under the name of Crown Motor Spirit), are the chief exhibits.

At this stand are to be seen reproductions in sterling silver of the Vickers-Vimy Rolls-Royce aeroplanes upon which the late Capt. Sir John Alcock flew from the new world to the old, and

Capt. Sir Ross Smith, from London to Australia—both aviators using Shell Aviation Motor Spirit exclusively. It is noteworthy that all four £10,000 prizes for aviation have been won on Shell Aviation Spirit. The same spirit was used in the great flights across Africa and from Rome to Tokio.

Diagrams and charts of general interest are being shown, together with specimens of various types of crude oils and their derivatives, also bitumen—which is of particular interest to the motorist in respect of its use in road construction. "The Story of Oil" and "Miles and Sterling" are two books which visitors will find interesting.

Simms Motor Units (1920), Ltd., Percy Buildings, Gresse Street, W. 1. (STAND 75)

VARIOUS patterns of H.T. magnetos and a display of sparking plugs are on view, while other specialities are the magnetic petrol gauge and the flexible "Vernier" coupling for magnetos. The magneto is in two patterns—one for four and the other for six-cylinder motors. The petrol gauge, it may be recalled, consists of a float,



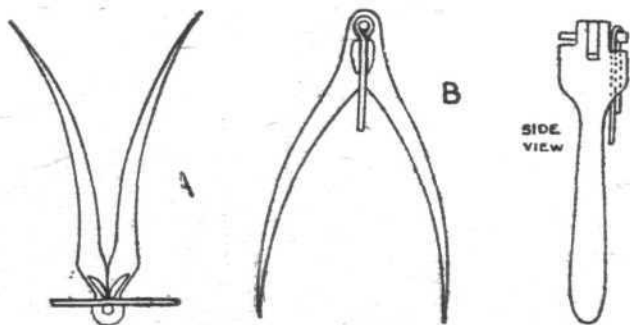
Simms "Vernier" coupling

which as it rises or falls, moves a magnet, which in its turn operates the hand indicating the amount of petrol in the tank. The Vernier coupling is an ingenious device which enables the timing to be varied as fine as $\frac{1}{16}$ th of a revolution, while the flexible connection enables the coupling to correct any mis-alignment between the engine shaft and the magneto armature.

Skefko Ball Bearing Co., Skefko Works, Luton. (STAND 87)

MANY examples of Skefko bearings are displayed at the Skefko stand, including several patterns of the famous Skefko double-row self-aligning radial bearings. Two interesting contrivances are to be seen at this stand—a bouncing ball apparatus, and a bent shaft model. The former consists of a circular anvil on which steel balls, shot to a considerable height by an electrical apparatus, continue to bounce for what seems an impossible length of time. The elasticity of these balls—standard balls for Skefko bearings—is a proof of the thoroughness of the hardening process to which they have been subjected. The other model consists of a bent shaft running in two Skefko self-aligning bearings. When the shaft is set in motion by a small electric motor one can see the way in which the bearings align themselves to the deflections of the shaft without any increase of friction. A new Skefko production, the split belt pulley, will also be shown.

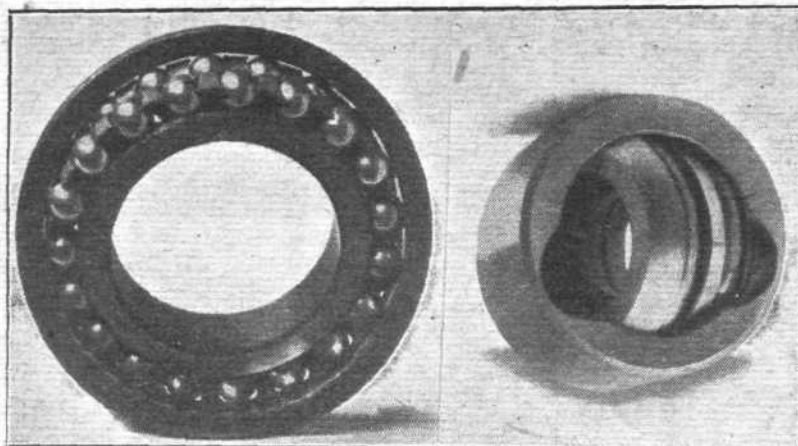
As well as a variety of housings for Skefko bearings used in connection



A useful tool for dealing with wire: Foxe's patent bending pliers made by Rubery, Owen and Co.

with line shafting. Their plummer blocks, hangers, etc., are specially designed with a view both to protecting the ball bearings from the in-

René Tampier, Danemere Street, Putney, S.W. 15. (STAND 78)
BLOCTUBE carburettors complete and in parts enable visitors to



Two typical Skefko bearings : On the left a double-row self-aligning bearing, and on the right a double-thrust bearing

trusion of abrasive substances and to retaining lubricant without wasteful leakage.

S. Smith and Sons (M.A.), Ltd., 179-185, Great Portland Street, W. 1. (STAND 91)

THE exhibit includes the whole range of aviation instruments manufactured and supplied by the firm. A feature of the exhibit is the complete aviation instrument board, type No. AA. 500, and a special show will be made of the new recording air speed indicator, and the atmospheric density meter. An instrument which is shown for the first time is the Smith Boiling Point Altimeter: an exclusive design of Messrs. S. Smith and Sons (M.A.), Ltd. The instrument is identical with the Smith altimeter, but has in addition a series of red figures round the dial which show the boiling point of water at various altitudes. It will therefore be seen that in the Smith Boiling Point Altimeter the pointer shows the height at which the engine is flying and automatically points to the corresponding boiling point of water for the height, thus allowing a constant check to be made on the radiator thermometer without reference to any correction tables or mental calculations.

There are also on view a full range of the Hughes compasses, together with a full range of M.L. magnetos and K.L.G. aero plugs.

study the principle of this ingenious fitting, which was extensively used on aero-engines during the War period. There are on view also the very ingenious Bloctube petrol pump in various styles, while the Bloctube system of hand controls is well worth investigation.

Tan-Sad Works, 9, Freeman Street, Birmingham. (STAND 35)

SPECIAL interest is being taken in the Tan-Sad aeroplane chair, which is designed specially for the job. The back can be removed or replaced as desired, or the chair can be entirely taken to pieces and packed flat, so that in the event of the dismantling of an aeroplane, it can be packed up and transported with the utmost convenience. A workshop chair on similar lines, but made in steel, can also be seen, as well as an adjustable table.

The Telephone Manufacturing Co., Ltd., Hollingsworth Works, Martell Road, West Dulwich, S.E. 21. (STAND 90)

THE "Laryngaphone," for intercommunication on aeroplanes and airships, and more particularly for use on air liners, enables the pilot, navigator or mechanic and steward to carry on intercommunication; that is to say, it is possible for the pilot, by simply pressing a button, to get into communication with any one of the other three. The telephone does not

pick up any outside noise, and it is claimed that it makes it possible to carry on a conversation under all conditions, at the same time leaving the hands quite free. The complete telephone is about the size of a wrist watch, and is attached to the throat by means of an adjustable band, the receiving tubes being worn under the airman's helmet. In addition there is shown a complete range of automatic intercommunicating telephones from single up to fifty lines' capacity, for general purposes, as well as visual indicators, round call and secret keys, hygienic mouthpieces, etc., also numerous types of accessories such as electric bells, terminal boxes, relays, etc.

John Thompson Motor Pressings, Ltd., Ettingshall, Wolverhampton. (STAND 24)

As the title of this firm would indicate, their exhibit consists of steel pressings, some of the most interesting being front nose cowlings of various patterns made in four, five or six sections. Main engine plate pressings are exhibited also.

Titanine, Ltd., 175, Piccadilly, W. 1. (STAND 39)

TITANINE non-poisonous dope, for which strong claims are made as regards flame-resisting properties, efficiency and economy, is on view, as well as samples of fabric coated with Titanine, and the various finishing materials made by the Company, including khaki pigmented oil varnish, transparent oil varnish, white dope resisting paint, and special distinctive colours for commercial machines.

Vacuum Oil Co., Ltd., Caxton House, S.W. (STAND 3.)

CORRECT lubrication is of first importance in aero-engine operation. Correct lubrication means the elimination of guesswork. It means lubrication specification on a scientific basis. Mechanical construction—the lubrication system employed—temperature encountered: these factors have to be considered in the selection of an oil which will meet all conditions correctly. Close study and wide experience of the problems met in aero-engine lubrication stand behind Gargoyle Mobiloils, the products of the Vacuum Oil Co., Ltd., of which samples are on view.

Vickers, Ltd., Vickers House, Westminster, S.W. 1. (STAND 13)

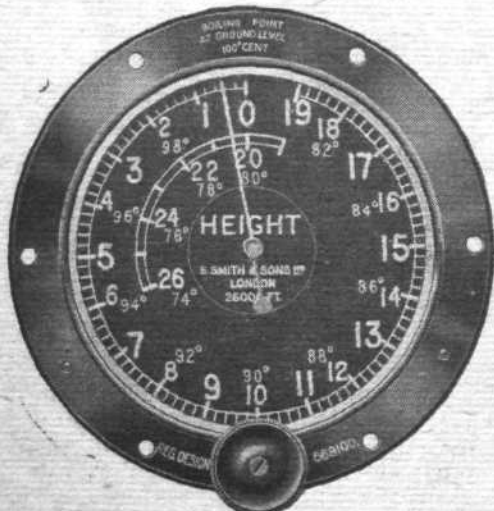
DURALUMIN is shown in rolled, drawn, and extruded sections, stampings, machined and pressed parts. One case contains wired-in samples of Vickers' various manufactures. In addition, samples of manufactured articles in the polished and unpolished state, e.g., spinnings in connection with Calthrop's aerial parachute, airship gas valve, etc., etc., and many other articles of interest is to be seen.

C. C. Wakefield and Co., Ltd., 30-32, Cheapside, E.C. 2. (STAND 88)

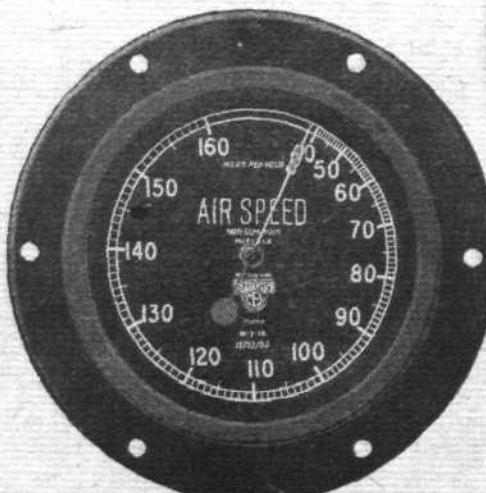
SAMPLES of the standard brands of Castrol is available for inspection, including the famous Castrol R, which was used on the R.34 during her Transatlantic trip. Sir Ross Smith's Vickers-Vimy-Rolls, and many other machines which have accomplished outstanding performances.

Wellworthy, Ltd., Lymington, Hants. (STAND 84)

As a result of their experience in producing and experimenting with



The Smith boiling point indicator



The Smith air speed indicator

piston rings for B.R.2 engines for the Air Ministry, this firm have produced the "Wellworthy" New Cross Piston Rings. The stand also contains a display of Gudgeon pins, valves, connecting rods, compression taps, petrol taps, etc.

Yorkshire Steel Co., Ltd., 30, Holborn, E.C. (STAND 77)

This firm is showing a variety

of patterns of the Holt "Autochute" life-saving parachutes, landing lights, parachute flares and landing lights, mail-dropping devices, air depth bombs, etc. Another speciality is the Ora anti-friction metal for aero engines. The "Autochute" system consists of three parachutes in tandem: (a) the auxiliary pilot, (b) the principal or shock pilot, and (c) the main parachute. The auxiliary pilot is not essential;

it is built as light as possible, and its function is simply to get the principal pilot in position for inflation in the shortest possible space of time. Should it fail to function, the principal pilot will inflate of itself. The system is a "free" one—that is to say that after the passenger has jumped from the machine there is no mechanical connection between the machine and the passenger.

THE OPENING LUNCHEON

At the inaugural luncheon on July 9, at which Mr. H. White-Smith, C.B.E., Chairman S.B.A.C., presided, Lord Londonderry, Under-Secretary of State for Air, proposed the toast of "The Aircraft Industry and the Exhibition." He said it was over over six years since those interested in the new art of aviation assembled at Olympia specimens of their handiwork and creative ability in what was then an infant industry. Though the stage in aviation at which we had now arrived has been to a great extent attained through the stimulus of war, and though much of the magnificent material we saw there today owed its development or even its very creation to military requirements, it was a Peace Exhibition.

In this country civil flying as we knew it had really been in progress a little over a year. Sir Frederick Sykes, Controller-General of Civil Aviation, has given statistics of his progress in the extraordinarily interesting two half-yearly progress reports which he had issued as public documents.

In reference to international progress, he could not permit the occasion to pass without alluding to certain alarmist and exaggerated statements which had recently been made about the developments in the air carried out by other nations, especially Germany. In that country there might be, as had been announced, millions of men fully determined to win back by the air what they had lost by sea and land, but the determination or desire or will to do this was a different matter from actual achievement and readiness. Over a year ago the German Press instituted a vigorous propaganda in favour of aviation, pointing out how necessary aerial communication would be in the future, and quoting statistics to prove the number of air routes that were in contemplation.

The situation as described in the Press was out of all proportion to the actual facts, of which he would endeavour to give a brief *résumé*. It had been stated publicly that there were now 18 companies or firms, with powerful financial backing, devoting themselves solely to scientific progress and preparation for rapid and immediate development. This amounted to a misrepresentation; so far as our information went, 49 undertakings had been licensed by the German Government and had received permission to participate in air traffic, when this was permissible. This figure was represented by 19 transport companies and 30 factories—of the companies only two were actually working, and that only to a limited extent; of the factories, four were engaged on research work and two were designing engines.

Arrangements were now being made for the resumption of Air Traffic in Germany on a small scale. For this purpose a few commercial undertakings were being permitted by the Commission of Control to use machines which were of no military value. These machines would bear a special seal as laid down by the Commission, and the police had received orders for the Government to allow only machines bearing this mark to fly.

As had been explained, the object of this newspaper campaign was to maintain public interest in the subject until aviation was a commercially practicable proposition; but there was no doubt that the Germans were fully alive to the national importance of aviation.

No one was more convinced than he was of its importance, of the vital necessity of maintaining progress and development, and of the desirability of awakening the national consciousness upon the subject, but nothing was to be gained by unnecessarily alarmist statements of the case. He would, therefore, recommend those who desired to know more in detail where we stand to study the half-yearly report on the progress of civil aviation issued last week by the Controller-General of Civil Aviation.

As to the part taken in the Exhibition by the Air Ministry, that was mostly illustrative of what had been, and was actually being done, by the Government as its share in national activity.

He regarded the Exhibition as a sign of the endeavour to assist the growth to full estate of a still youthful industry,

a position from which, he was sufficiently optimistic to think, it was still far. It was to be hoped that in future the Exhibition would not only be international in intention, but also more in fact than it was this year. All those who had the progress of aviation at heart had reason to thank the joint Exhibition Committee of the Society of British Aircraft Constructors, and the Society of Motor Manufacturers and Traders, for what they had done in their combined effort to advance a subject which was of such importance to the whole world. And if one name could be coupled with this effort more than another, it was that of Mr. White Smith, the Chairman of the S.B.A.C., so well known as one of the wholehearted backers and pioneers of the aviation industry from its earliest days.

Mr. White Smith, in replying, said that these aero exhibitions might be regarded as the milestones along the road of progress. One had only to go round the exhibition to realise how great was the distance travelled since the pre-War effort. He thanked Lord Londonderry and the officials of his Department for the splendid exhibit which the Air Ministry were showing and for the part they had taken in the Exhibition. This exhibit was a wonderful demonstration of the activities of the Air Ministry, and for all who saw it it was bound to be of great educational interest. The designers were the backbone of our construction. Their only anxiety was that these designing staffs should be maintained on as strong a basis as possible. They felt sure that the Air Ministry would realise the importance of this, and would make every effort to place orders for as many experimental types of aircraft as possible so that there might be no disintegration of this vital side of their business.

The toast of "Our Guests" was in the hands of Mr. R. O. Cary, O.B.E., Vice-Chairman of the S.B.A.C., who drew attention to the remarkable number of foreign representatives present, hoped they would all return and tell their respective Governments how we had progressed. Mr. Cary, in speaking of those pilots who had made history in the War, put forward a very happy simile in suggesting they were comparable to the Knights of Old, who rode out and challenged the individual to battle in single combat. So our Squadron-Leaders sallied forth and in the air in like manner challenged the enemy's right to hold sway there.

In reply, M. P. E. Flandin, French Under-Secretary of State for Aviation and Aerial Transport, spoke in terms of praise of the working together in the air of the forces of both countries, and congratulated the Society upon the remarkable assembly of exhibits which were to be seen in Olympia.

Air-Marshal Sir H. M. Trenchard, Bart., in supporting, said he was glad to have the opportunity of letting those engaged in civil aviation know the deep debt of gratitude which he thought the country owed to the industry for their work during the War. It was of the utmost importance that that industry should be kept alive, and he hoped that in the future it would be as great as our shipping trade.

Maj.-Gen. Sir F. H. Sykes also responded, and said that in being asked to address a few words to them on behalf of Civil Aviation, he fully appreciated the importance of that occasion. In 1914, the last time that the products of the British aircraft industry were exhibited in England, they recognised the potentialities of aircraft as a new arm in their fighting forces. Few, however, could have foreseen the advance which had actually been made during the last six years. That advance was exemplified in this Exhibition.

We had conquered the air and our immediate task was to exploit our victory in the interests of commercial development. To this end we must study the many factors which will make for commercial success—the speed, endurance, reliability, and carrying capacity of aircraft; comfort in passenger transport; and efficient and economic ground organisation; the maintenance of a body of skilful pilots and the development of the "air-sense" of the population as a whole. Each country, he thought, could assist in the

task and add something to the sum total of the knowledge and experience urgently required for the promotion of this new science. The International Air Convention had been signed by 23 States, which included the Dominions, and before long the International Commission should be at work. International co-operation was not antagonistic to national efficiency, upon which the life of each nation depends.

Here in England we are attempting to deal with the various problems of aviation. Aviation was now adjusting itself to the requirements of peace. In accordance with our national characteristics, we were endeavouring to meet these new requirements practically and steadily. Our policy was not to launch out into large schemes, but rather to start slowly and, as experience accumulated, to consolidate the position. Since August 26, 1919, when international flying was first permitted, air services had been conducted between London, Paris, Amsterdam and Brussels by Messrs. Handley Page, the Air Transport and Travel Company, and Messrs. Instone, and it was a remarkable fact that throughout the winter months there were only ten days on which Airco machines were unable to make the journey from London to Paris. On May 1, a double service to Paris was inaugurated, machines flying twice daily from each capital. Last Tuesday the first air mail left for Amsterdam, carrying letters at the greatly reduced cost of 5½d. an oz., and he hoped that arrangements for a similar service between London and Brussels would shortly be completed. The degree of safety, endurance and reliability attained by these services was a convincing proof of the steady progress that had been achieved, and should lead in due course to their extension to more distant centres, so that the value of the aeroplane's speed could be even more decisively demonstrated.

It was satisfactory to find in the Exhibition specimens of the most modern seaplanes, flying boats, and amphibians. In our seagirt Empire, it was essential to develop these types of aircraft for coast work and transport involving flight across the sea. He hoped that before long we should have a service, employing these types for the carriage of mails. There were many parts of the Empire, too, the West Indies for instance, which were favourable to their development.

At the same time as private enterprise was initiating services to the Continent and the Air Ministry was assisting by ground organisation and the collection and dissemination of information, it was rightly felt that there were broader aspects of British aviation which could not be neglected, and that something must be done towards its development as an Imperial asset. The Imperial air routes were consequently projected. They had been criticised in some quarters as costly to organise and commercially valueless. Such criticism, in his opinion, betrayed a complete misapprehension of their real utility. No doubt there were Elizabethan cynics who estimated the value of Drake's circumnavigation of the world solely in terms of Spanish gold. Our purpose was not to attempt the establishment of commercial routes, but to demonstrate in the only practical manner possible that these tremendous distances could be flown by modern machines and that the Empire could be linked up by air. Both these things had now been demonstrated by a series of remarkable flights and, in addition, we had gained invaluable experience, had stimulated the interest of the Dominions and Colonies, and all this at a comparatively small expenditure.

The following figures from his foreword to the programme of this Exhibition were, he thought, striking:—The number of flights carried out in the first year of civil aviation was 38,954; the approximate mileage flown was 734,200 miles; the number of passengers carried was about 70,000, of whom only one met with a fatal accident, and the weight of goods transported amounted to 116,498 lbs. 114 aerodromes were licensed, and 519 machines registered. Between August 26, 1919, and the end of March, 1920—a period of seven months—there were about 400 departures and arrivals of aircraft to and from the Continent, the great majority being British. For the last three months alone this figure rose to well over 1,000 and over 1,000 passengers were carried between England and the Continent by air. Up to the end of March, over £200,000 worth of imports and exports were carried by air between the United Kingdom and the Continent.

There were many difficulties to be overcome, but he was confident that by united efforts they would be overcome.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

AERIAL DERBY

The Aerial Derby will be held at the London Aerodrome, Hendon, on the afternoon of Saturday, July 24, 1920. Members will be admitted free on presentation of their Membership Cards.

It has now been decided to receive entries up to noon on Saturday next, July 17.

Entries

The following entries have so far been received:—

Owner	Pilot	Machine	Engine
A. V. Roe and Co., Ltd.	Capt. H. A. Hamersley, M.C.	Avro "Baby"	35 h.p. Green
Bert Hinkler Squadron-Leader T. O'B. Hubbard, M.C., R.A.F.	Bert Hinkler Squadron-Leader T. O'B. Hubbard, M.C., R.A.F.	Avro "Baby" Martinsyde "F.4"	35 h.p. Green 260/275 h.p. Falcon Rolls-Royce
Martinsyde, Ltd.	F. P. Raynham	Martinsyde "Semi-Quaver"	300 h.p. Hispano-Suiza
The Nieuport "and General Aircraft Co., Ltd.	L. R. Tait Cox	Nieuport "L.S.3"	320 h.p. A.B.C. Dragonfly.

The "Nieuport" and General Aircraft Co., Ltd.	John Herbert James	Nieuport "L.C.1"	320 h.p. A.B.C. Dragonfly
Lieut.-Col. F. K. McClean	Capt. W. L. Jordan, D.S.C., D.F.C.	Sopwith "Snipe"	200 h.p. B.R.2.
Leth Jensen	Leth Jensen	S.P.A.D. "S.29"	80 h.p. Le Rhone
Bristol Aeroplane Co., Ltd.	C. F. Uwins	Bristol "Bullet"	450 h.p. "Bristol" Jupiter
A. V. Roe and Co., Ltd.	Captain Denis Geo. Westgarth Heslam	Avro-Schneider	200 h.p. Siddeley-Puma
Frederick Siddeley Cotton	Frederick Siddeley Cotton	De H. 14a	450 h.p. Napier-Lion

London Flying Club

The Committee of the London Flying Club has very kindly made arrangements for the Members of the Royal Aero Club to be Honorary Members of the London Flying Club on July 24, 1920.

This Club, which adjoins the Aerodrome at Hendon, affords every facility for Luncheon, Tea and Dinner.

In the evening there will be a Special Dinner and Dance. Further particulars will be posted later to Members.

Offices: THE ROYAL AERO CLUB,

3, CLIFFORD STREET, LONDON, W. 1.

H. E. PERRIN, Secretary.

The Wright Patent Litigation Again

It appears as though the proposal to import British machines into the U.S. may lead to the revival of the protracted litigation over the Wright patents. From New York comes word that in a suit brought by the Wright Aeronautical Corporation of Paterson, New Jersey, in the Federal Court a decision was given restraining perpetually the Inter-Allied

Aircraft Corporation of New York from selling or using in the United States foreign-built machines, which are liable to a charge of infringement of American patent rights.

A similar suit is pending against the Aerial Transport Corporation of Delaware, which is alleged to have planned the use of British aeroplanes for an aerial express service between Chicago and New York.

AIRISMS

FROM THE FOUR WINDS

A PROFIT of close upon eleven millions sterling has been netted towards the working expenses of running this little island of ours, from the Government Aircraft Insurance scheme, brought into being as a result of a suggestion made by FLIGHT in October, 1914. It was then that FLIGHT started its campaign in favour of making this liability for damage by aircraft a national one, but failing its being, as it should have been, a national charge, then FLIGHT claimed it should be turned into a national asset by means of a Government Insurance Policy. And it was. But not until July, 1915, following continuous articles in FLIGHT. By that time the "professional" insurers had grown exceeding fat from the premiums already extracted from the alarmed public. Else would the nation's profits have been vastly more than the eleven millions now to be recorded. Government trading in the proper sense we are dead against. But this was no case of "trading"; it was a case in which the Government, shirking its natural Imperial war responsibilities, had the alternative opening for sweeping into the National Exchequer direct taxes in the form of "premiums," which would otherwise have merely gone to swell the War wealth of insurance profiteers who were cute enough to take advantage of the Government's apathy in shouldering its just liabilities on behalf of the nation as a whole. However, all's well that ends well, and after all, there is the consolation that there would now have been this extra bit to wring out of the taxpayers' pockets in some direction or another had it been otherwise.

In a stupendous list of company registrations at Somerset House for the past six months of this year, compiled by Messrs. Jordan and Sons, Ltd., the grand capital total is £448,738,317, distributed over 6,415 companies. Prodigious! "Air" figures in this somewhat modestly with 10 companies, having an aggregate capital of £529,600. Which is nothing to worry about. For the aircraft industry to have received the "patronage" of the wild-cat company-promoting ruffian, so soon as it had come through the War, would have probably proved one of the most disastrous set-backs which the future of the industry could well have had thrust upon it. It is now

emerging naturally out of its chrysalis stage and in due time will come to maturity and spread its wings with a permanent spread the world over. To that time we look forward without the least doubt or uncertainty.

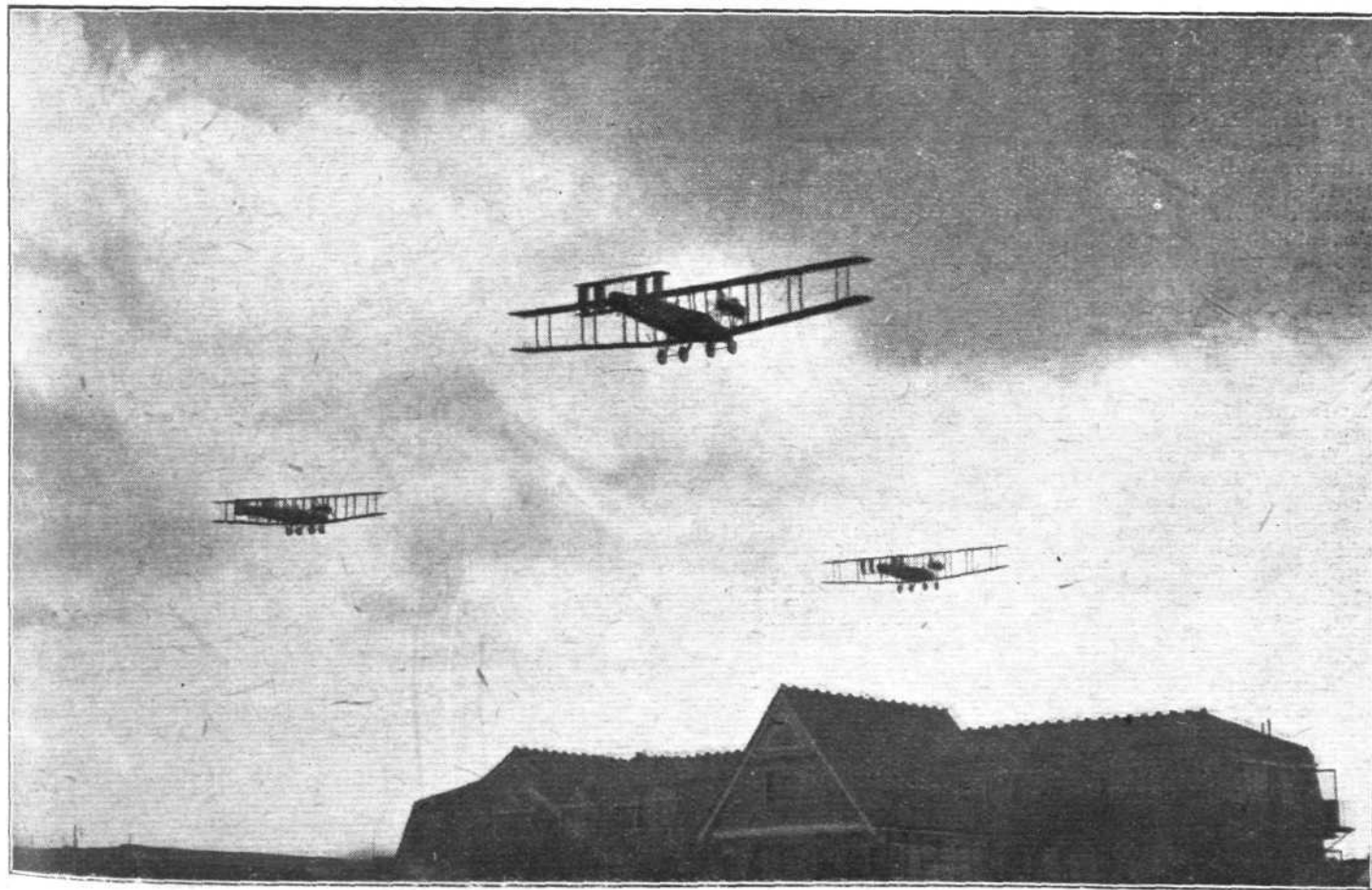
THREEPENNY air-letter postage between London and Amsterdam, with the prospect of a similar charge to Paris, is getting a little nearer sanity. What the vested interests are that could invent so outrageous a handicap as half-a-crown an ounce is not a very pleasant or savoury contemplation.

WHEN is that British Aerial-Post Stamp to come into being?

THE hunting of seals and whales by the help of seaplanes is getting into practical form, as it is now definitely stated that this method is to be employed in Denmark Strait, between Iceland and Greenland. For some time past aircraft have been used for locating the herring and brisling shoals off the coast of Norway, and they are also being used by the United States Aviation Service for detecting schools of fish in Chesapeake Bay. A syndicate at Aalesund is said to be financing the seal and whale hunting venture.

FLYING across Africa under present-day conditions is, it must be acknowledged, hardly a pastime for common or garden suburbia to indulge in. Dr. Chalmers Mitchell, at the Aldwych Club the other day, outlined some further travel silhouettes in these regions which he experienced during his little Cairo-Cape flip. These depicted a game of tennis in a African town, interrupted by two antelopes careering across the court, charged by a leopard; bathing at Dar-es-Salaam on the shore, with six lions lying calmly at rest within 300 yards of the bathers, and an aeroplane skimming just above the rapids of an African river and unable to rise for two miles.

Dr. Mitchell again gave a vivid and expressive description of the descent from above, the great, twisting, ancient Nile, the swamps, the lions which they heard all night but never saw, great herds of elephants trumpeting with fright when



Super Handley Pages as they passed over the Hendon enclosures in formation immediately after rising from the Aerodrome during the R.A.F. Pageant.



A beautiful plaque cast by Messrs. Singer and Sons, of London and Frome, from the design of Mr. Reid Dick, for the directors of the Rolls-Royce, Ltd., as a permanent record of the first direct flight across the Atlantic, which was made by the late Capt. Sir John Alcock and Lieut. Sir Arthur Whitten Brown, to be displayed at the firm's various premises throughout the world. The wording on the plaque is: "The first direct flight across the Atlantic was made on June 14-15, 1919, on a Vickers-Vimy aeroplane, fitted with two Rolls-Royce engines of 360 h.p. each. Pilot, Capt. Sir John Alcock, K.B.E., D.S.C.; Navigator, Lieut. Sir A. Whitten Brown, K.B.E. This tablet is erected by Rolls-Royce, Ltd., in appreciation of the care and skill displayed by Mr. F. Henry Royce, the engineer-in-chief, and his assistants in the design of the engines and of the services of the experimental staff and of all workers at Derby in connexion with their construction"

they heard the roar of the engines, and the natives, who were very respectful when the party landed, but who, on seeing the plane fail to rise at the first attempt, produced spears and wanted to "dish the white men up!"

Dr. Mitchell told finally of the last episode, when one of the engines "cut out" at a height of 100 ft. or so. The machine stood first on its tail, then on its head, and finally fell right side up on the ground.

It is hardly surprising to learn from the doctor that at this juncture "we all got out, and congratulated each other."

"HONEYMOON in an Aeroplane."—It is reported from Bologna that an aeroplane, coming from the direction of Milan, was observed recently conveying an English bridal couple on their honeymoon. Another aeroplane is reported to have been seen following with the luggage." (*Daily Paper.*)

Smart observer that, if a "ground" one! Or was it a stowaway "Peeping Tom?"

SEEKING fame at the cannon's mouth we can appreciate when the cause is good. But what sort of fame it is that is sought for by shooting Niagara Falls in a 6-ft. barrel is somewhat beyond our level. Our sympathy is rather with the

widow and family of Charles George Stephens, a hairdresser, whose death as a result of this suicidal folly is just reported. Stephens is reported as having been in his past keenly interested in aeronautics, having accomplished many daring parachute descents. He might well have kept to this art and have done himself and posterity some possible good thereby. But presumably some irresistible impulse follows this type of daredevil through his life and prompts him to unnecessarily sample every mad danger that may come toward, as amongst other "stunts" in which Stephens is reported as having indulged are the kissing of lions in their den, shaving his clients (lucky client) in a lion's cage with lions prowling around him, and upon another occasion he stood before an American knife thrower, and had an apple placed on his throat cut in two by a sword.

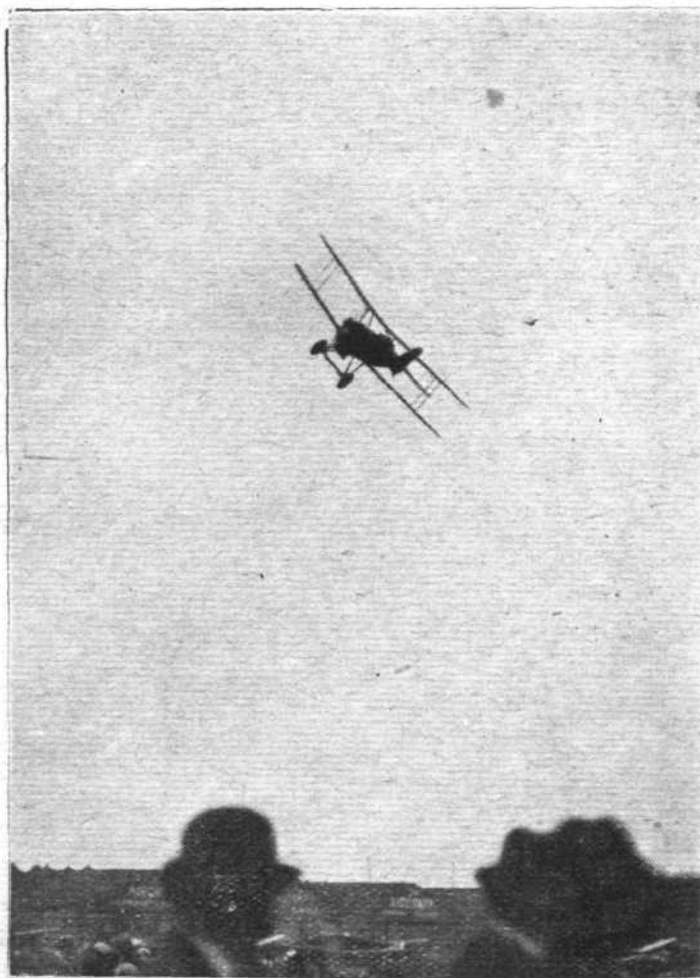


The "L.72" Arrives in France

GERMANY has now delivered one of the Zeppelins—the "L.72"—allotted to France. The airship, carrying a crew of 14 and two French officers, Engineer Sene and Naval Lieut. Plessis, set out from Friedrichshafen at 9.30 p.m. on July 9, and was sighted at Metz at 2.15 p.m. the following day. She approached her destination, Mauberge, at 4.10 p.m., and the landing party of 600 soldiers had her safely berthed in their hangar prepared for her at 5.55 p.m.

Another Air Post in China

AMONG the air post schemes now being organised in China is one to link up the cities of Shanghai, Yichang, Hankow, Chung King, and Chengtu. A company has been formed by Chinese and Americans, and eight American machines are to be used to carry mail and passengers. Although it is stated that the Chinese postal authorities have accepted a bid to carry mail on this service, no details of the rates are available.



AT THE R.A.F. PAGEANT: Flight-Lieut. Noakes, A.F.C., M.M., on "S.E.56," during his remarkable series of exhibition flights, described by "Contact" as "an exhibition of circus-flying on an 'S.E.5B.' Loops, rolls, spinning nose-dives—all the contents of the aerial bag of tricks were displayed at a height of 1,000 ft., to the accompaniment of gasps from the packed enclosures."

AIR MAIL SERVICES

Air Mail Service to Morocco

THE Postmaster-General announces that he has made arrangements with the French Post Office whereby letters for Morocco may be forwarded by the French air mail service which is running between Toulouse and Rabat on prepayment of a special fee, additional to the ordinary postage, at the following rates: Packets weighing not more than $\frac{1}{2}$ oz. 1s.; over $\frac{1}{2}$ oz. and not more than $3\frac{1}{2}$ oz., 2s.; $3\frac{1}{2}$ oz. and not more than 7 oz., 3s.

All classes of correspondence, except parcels, insured letters, and cash on delivery packets, are admissible; but the weight of a single packet may not exceed 7 oz. The latest times of posting in this country in order to secure connection are as follows:—(a) In the provinces on Sundays and Thursdays in time for the night mails for London; (b) in London on those days up till the latest night collections.

Air Mails in Spain

POSTAL aviation is making rapid strides in Spain, judging by a message from Madrid. This states that King Alfonso,

before leaving for London, signed a decree establishing aerial postal lines between Seville and Larache (Morocco), between Barcelona and Palma (Majorca), and between Malaga and Melilla, in Spanish Morocco.

Speeding up Australian and Indian Mails

EVERY few hours saved in the journey to India and Australia is important as far as mails are concerned, and it is not surprising to hear that included in the morning's 9.30 Air Mail to Paris on July 9 were two bags of mail labelled to Bombay and Fremantle. This method of sending late mails allows letters for India and Australia to be posted in London up to 8.15 a.m. on Friday and up to the last post on Thursday, in the provinces. After conveyance to Paris by air the mails are placed in the Paris-Marseilles express, and catch the Indian mail boat at Marseilles.

The Post Office have under consideration a scheme for sending late Indian and Australian mails direct from London to Marseilles, by air, in which case they would not leave London until Saturday morning.

AVIATION IN SWEDEN

IN his Report on the Commerce and Industry of Sweden for 1919 Mr. S. E. Kay, H.M. Consul at Stockholm, states that the hydroplane appears to be the most suitable type of aircraft for Sweden, and considerable interest is shown in aviation generally, although little, if anything, has been done to develop commercial aviation. The establishment of an air service between Sweden and Germany, and Sweden and Denmark has been discussed, but it is expected that only mails and passengers would be carried. As regards a service with England, it appears that the weather conditions in the North Sea would prevent any regular service. A printed circular issued for the Warnemünde-Malmö route claims that this mode of transport shortens the passage from 36 hours to 12 hours. The charges for the air transit from Warnemünde to Sassnitz are M. 1,200 per passenger, and M. 10 per kilo of baggage.

At Gothenburg there is also considerable interest in this

branch of transport, but no practical steps have been taken to develop commercial aviation, in spite of the existence at this town of an aeronautical club. At Malmö nothing appears to have been done in this direction.

The art of flying is not highly developed in Sweden. Aeroplanes are manufactured in Sweden, but the factories are at present unable to compete with the German machines, which can be sold cheap owing to the low rate of the mark.

It is reported, in the Swedish Press of December 16, that the Air Traffic Company of Stockholm has commenced to erect its first flying station at Sundsvall, and that this company intends to erect stations at Örebro, Karlstad, Norrköping, Motala, Mariestad, Venersborg, Gothenburg, Halmstad, Malmö, Trelleborg, Kristianstad, Rönneby, Kalmar, Vester-vik, Gelfe, Söderhamn Hudiksvall, Jönköping, Vernamp, Hallsberg, Malköping, Skillingaryd, Hesselholm and Sköfde.

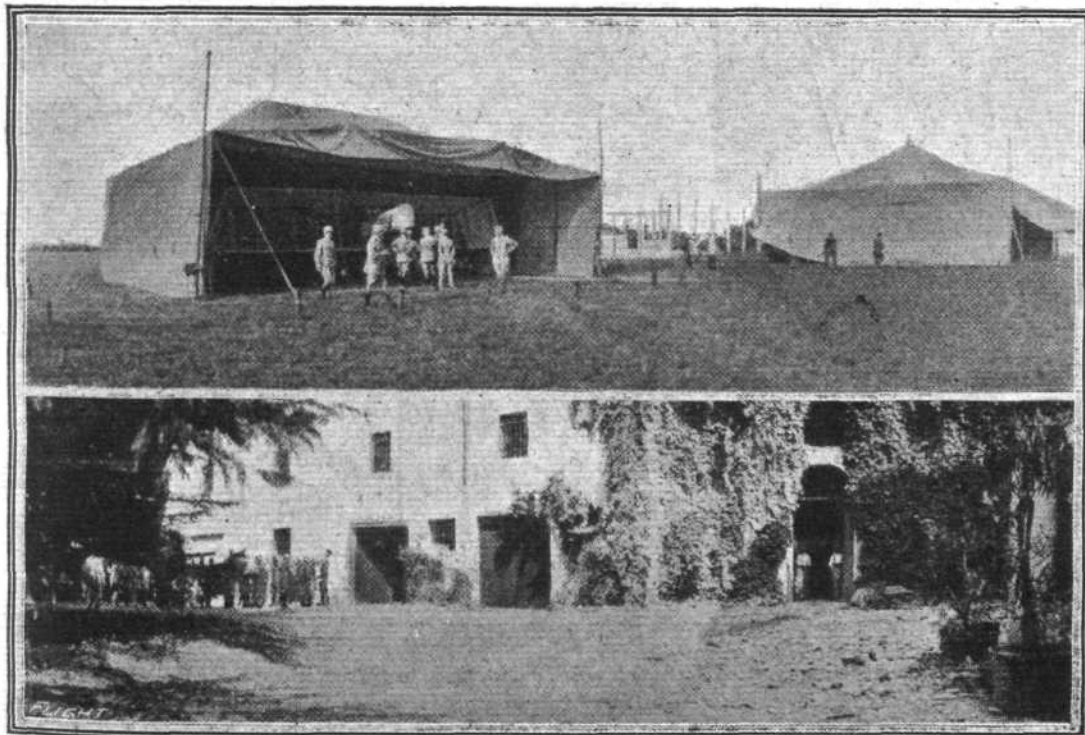
A Competition for Olympia Visitors

THOSE who pay a visit to Olympia have an opportunity of securing either a free trip by air to Paris or a fine view of London from above. A competition has been organised with the object of securing the best catch phrase applicable to the London-Paris Air Service, and entry forms can be obtained at the turnstiles. The prize for the best answer is a free return flight to Paris, and the six other prizes are free flights over London. The machines in which the prize flights will be made will be provided by Messrs. Handley Page, Ltd., Aircraft Transport and Travel, Ltd., and the Instone Air Line, Ltd.

Art and the Air

AMONG the few artists who have applied themselves seriously to the task of dealing with aviation subjects, Mr. Geoffrey Watson has already won fame, and the exhibition of his paintings and drawings, at the Brook Street Art Gallery, should further add to the popularity of his work.

Those who have not yet visited the exhibition may be reminded that it remains open until Wednesday, July 21. The charge for admission is 1s. 3d., and the proceeds will be devoted to the R.A.F. Memorial Fund.



Aviation in Italy: An echo of the past. The top photograph shows the Count of Turin before a tent hangar at the front. In the lower picture are seen the King of Italy and the Count of Turin visiting a house that has been bombarded by aeroplanes

AIR MINISTRY NOTICES

Pyrotechnic Demonstrations—Small Arms School, Hythe, Kent

It is hereby notified that:—

Demonstrations of lights, flares, rockets and signal grenades in connection with practice at the Small Arms School, take place about 500 yards west of Hythe.

The arrangement of these displays depends to some extent upon the weather, and a practice may be appointed any day or night in such a way as to preclude any notice being given.

Airmen are warned against mistaking these displays for aerodrome or landing signals.

(Notice to Airmen No. 78.)

Use of Aerodromes in Egypt and Mesopotamia by Civil Machines

It is hereby notified that:—

Notice to Airmen No. 63 issued on June 3 is only operative provided that pilots of aircraft wishing to land in Egypt have first obtained permission from the local authorities.

(Notice to Airmen No. 79.)

Royal Visit to Isle of Man—Warning re Flying

THE following is hereby notified:—

Pilots are warned that, on the occasion of Their Majesties' visit to the Isle of Man on the 14th and 15th instant, they should abstain from flying over the Royal Yacht or Fleet, or over the route of the Royal Procession.

(Notice to Airmen No. 80.)



COMMERCIAL AVIATION IN GREECE

In the report of the commerce and industry of Greece for the year 1919, Mr. E. C. D. Rawlins, of the British Legation at Athens, says it is understood that the Greek Government have for some time past been considering the question of commercial aviation in Greece, and that their policy is to encourage the development of commercial aerial routes between Athens and Brindisi, in connection with the main trunk aerial route from London to Paris, Paris-Rome, Rome-Brindisi, and services from Athens to Salonica-Constantinople, and Athens-Suda Bay-Alexandria in the other direction. The object of these routes would be mail and passenger carrying services.

There is an excellent aerodrome about 8 miles N.N.E. of Athens, called Tatoi Aerodrome, which is at present in the occupation of the Greek Naval Air Service. There is also a military aerodrome at Goudi, on the outskirts of Athens, and a further military aerodrome at Eleusis.

In connection with the proposed services Brindisi-Athens, owing to the frequent storms which occur during the winter months on the West Coast of Greece, it would be necessary to provide frequent aerodromes on the way, for purposes of sheltering during storms, re-fuelling, etc. The first of these would probably be in Corfu, where the only suitable site for an aerodrome is near Corfu town, on the marsh opposite the Isle of Ulysses. Patras, owing to its commercial importance, would probably be a further station on the route. There are no aerodromes suitable for large or fast machines in the vicinity of Patras, but large tracts of land exist, at present used as vineyards, which could be converted into aerodromes. Between Patras and Athens, there is no known place suitable for an aerodrome. It is understood that the Greek Ministry of Communications is considering propositions from interested firms with regard to carrying out the projected aerial routes mentioned above.

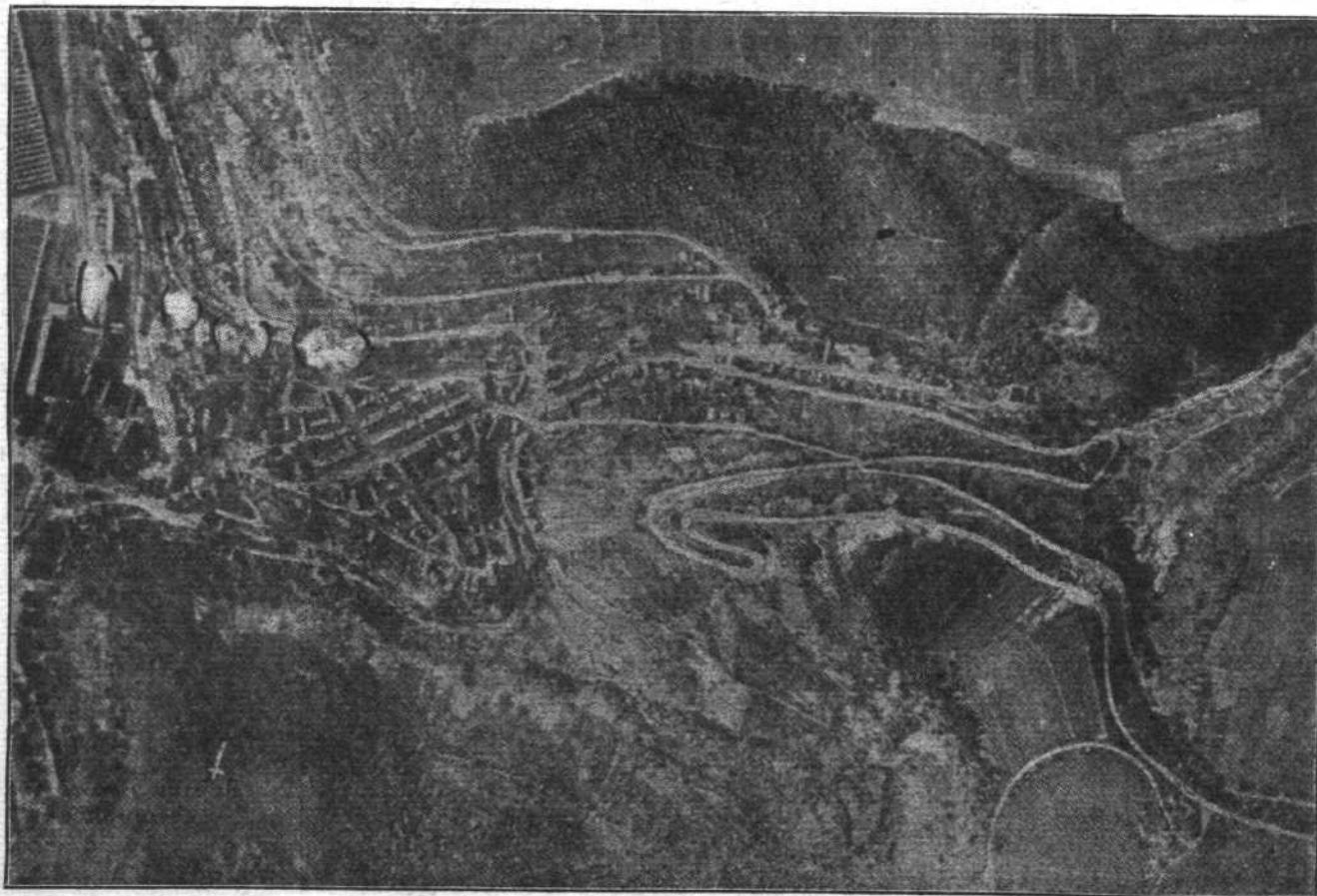


A Dementi

THE story that French aeroplane constructors were to be assisted in China by the sale to them of material originally intended for Russia, appears to be somewhat exaggerated. Anyway, it has been officially denied in France.

A Franco-Spanish Service

IF the seaplane service between Bayonne and Bilbao, which was inaugurated last week, meets with success it will ultimately be extended to Bordeaux and along the coast of Asturia and Galicia to Vigo on the Spanish side.



BOMBING OBERNDORF, A GERMAN VILLAGE, FROM ABOUT 12,000 METRES.—Note the four bombs bursting as direct hits on the railway station and yards. The winding roads provided a very fine landmark for those operating from above

IN PARLIAMENT

The Paris Mails

† **LIEUT.-COL. GUINNESS**, in the House of Commons on July 5, asked the Postmaster-General whether he can give the average number and total weight of letters which are posted in, or pass through, London daily for Paris or places beyond, carried by the ordinary mail and by the air mail, respectively?

† **Mr. Pease**: The average daily weight of letters and postcards sent by the ordinary mail from this country to Paris and places in France beyond Paris is 1,700 lbs., including about 850 lbs. for Paris itself. Precise figures of the number of articles are not available, but they are estimated at from 50,000 to 55,000 a day. The number of letter packets sent every weekday by the air mail to Paris averages about 85, and the total weight is from 5 to 6 lbs.

Civil Aviation

† **MAJ.-GEN. SEELY** on July 5 asked the Lord Privy Seal whether the Government have considered the recently published Report of Lord Weir's Committee on Civil Aviation; and what action it is proposed to take in the matter?

† **Mr. Churchill**: I have been asked to answer this question. The Report is still under the consideration of His Majesty's Government, and no final decision has yet been reached.

Maj.-Gen. Seely: Can the right hon. gentleman say when it is likely that a decision will be taken on this very important matter? The report has been in for some time. It was drawn up more than two months ago. Can the right hon. gentleman give any idea when there will be a decision?

Mr. Churchill: I cannot give a date. I hope it may be possible in the course of the present month.

Mr. Billing: Is the right hon. gentleman aware that there is complete stagnation in civil aviation pending a decision on this matter?

Mr. Churchill: I am not aware that there is complete stagnation. On the contrary, a considerable amount of progress has been made.

R.A.F. Married Establishments

† **SIR W. JOYNSON-HICKS** asked the Secretary of State for Air whether the question of married establishments for officers and men of the Royal Air Force has yet been decided?

Mr. Churchill: It is almost certain that a married establishment will be approved, but it should be remembered that the provision of this establishment entails, in addition to other expenses, a serious increase in the Building Vote.

Sir W. Joynson-Hicks: When will they be approved and when will there be any chance of the officers and men of the Air Service being allowed to have their wives in India?

Mr. Churchill: I am still engaged in discussion with my right hon. friend the Chancellor of the Exchequer upon the subject, and it is obvious that there are two sides to this question.

Sir W. Joynson-Hicks: Could it not be paid for out of the Indian finance?

Mr. Churchill: I am also engaged in discussion with the Secretary of State for India.

Sir W. Joynson-Hicks: I think that that is a better shot.

Zeppelin "L 71"

VISCOUNT CURZON asked the Secretary of State for Air whether it will be possible for the "L 71" Zeppelin airship to make a cruise over London at an early date to give the inhabitants as close a view as possible of this type of airship?

Mr. Churchill: I hope that the public may have opportunities of seeing this airship at some future date, but at the present time a cruise such as that suggested would mean the diversion of men and money from more important work.

Ministry of Air—Temporary Staff

LIEUT.-COL. PARRY asked what are the temporary circumstances which make it necessary to maintain a temporary staff of 2,007 at the Air Ministry; what is the annual cost of this staff; and when it is anticipated that the need for their services will cease?

Mr. Churchill: The figure for this permanent staff corresponding, for the same date, i.e., May 1, to 2,007 was 757, but it is of course not contemplated, and would not be possible, to reduce the Air Ministry staff to this latter figure, as is apparently suggested in the last part of the question. The reasons why so large a portion of the total staff are at the present time on a temporary basis are as follows:—

(1) The Departments of Civil Aviation, Supply and Research and Works and Buildings have been advisedly engaged on a temporary footing in the first instance. As the eventual requirements and commitments of the Ministry become better defined, the numbers will be reviewed and where necessary reduced.

(2) Messengers, labourers, cleaners and some other similar categories are normally engaged on a temporary basis in all Government Departments.

(3) The Air Ministry is a new Department, and progress in obtaining permanent staff must needs be gradual.

The annual cost of the total temporary staff is about £540,000. The number of the temporary staff is being progressively reduced both by replacement by permanent staff and by discharge without replacement.

R.A.F. Motor Cycles and Sidecar Combinations

MAJOR BREESE asked the Secretary of State for Air how many passenger-carrying motor-cycle and sidecar combinations are now in the possession of the Royal Air Force; and for what use these vehicles are provided?

Mr. Churchill: The number of passenger-carrying motor cycles and sidecar combinations now on the strength of the Royal Air Force, including those in Ireland, Egypt and Mesopotamia, is 472. In addition, 131 are awaiting dispatch to the Colonies as free gifts, and a further 870 are in course of being handed over to the Disposal Board. Passenger-carrying motor cycles and sidecar combinations are provided for urgent dispatch work and for use in place of heavier vehicles, the running costs of which are greater.

Municipal Aerodromes

LIEUT.-COM. KENWORTHY asked the Secretary of State for Air how many municipalities have expressed their willingness to take over aerodromes in the vicinity of their towns, and which these municipalities are; and what is being done to meet their wishes?

Mr. Churchill: At present under the general law, municipalities have no power to acquire or maintain aerodromes, but it is intended to confer this power upon them by the Air Navigation Bill now before Parliament. Two important municipalities, Edinburgh and Sheffield, have themselves introduced Private Bills this Session with the object of obtaining the necessary powers, and others, while not definitely committing themselves to such undertakings, have shown interest in the matter. For example, at the invitation of the municipalities, new sites for aerodromes have been inspected at Liverpool, Chester, Leeds and Bradford. When the necessary powers are obtained, it is hoped that many municipalities will avail themselves of them, and the Air Ministry will continue to give them any assistance in their power.

Aeroplane Flight to Kieff

LIEUT.-COM. KENWORTHY on July 7 asked the Secretary of State for War whether General Carton de Wiart obtained permission from the War Office to take part in the demonstration flight to Kieff in a Bristol aeroplane on behalf of a Polish syndicate; and whether it is considered part of General Wiart's duties to take part in demonstrations of this kind?

Mr. Churchill: The answer to both parts of the question is in the negative. There is no objection to a British officer taking an aeroplane flight; in fact, although not forming part of his duties, the interest displayed by General Carton de Wiart in the enterprise appears commendable.

Lieut.-Com. Kenworthy: May I ask whether this flight was not made to advertise this Polish syndicate; is this syndicate a commercial venture, and if this is the case is it not rather improper for a British General to do such a thing?

Mr. Churchill: No. Consideration of the circumstances has led me to the conclusion I have already conveyed to the hon. and gallant Member.

Aircraft in Germany

LIEUT.-COL. FREMANTLE asked the Secretary of State for War whether Germany is preparing a fleet of 47,000 aeroplanes; and what steps are being taken to seize their stock and prevent further manufacture?

Mr. Churchill: The manufacture of aircraft by Germany at the present time is stopped. This situation cannot be substantially modified for several months. There will no doubt grow up in time a German aircraft industry. I cannot forecast its development, but as the figure of 47,000 aeroplanes is approximately that of the whole war construction of Germany for five years, it is, to say the least, highly improbable that any such figure could be reached under peace conditions for a great many years to come.

Mr. Pemberton Billing: Are the Government taking any steps to supervise the design of the German commercial aeroplane to see that it is not capable of rapid conversion into a war machine?

Mr. Churchill: The question of the execution of the Treaty is entrusted to the Inter-Allied Commission on the subject, and I cannot undertake to answer on their behalf.

Sir W. Joynson-Hicks: Does the answer that aircraft are not being constructed in Germany extend to airships?

Mr. Churchill: I could answer that with notice.

The Royal Naval Air Service

Mr. R. YOUNG asked the Secretary of State for Air what was the method adopted to inform commanding officers of the names contained in the promotion lists issued by the Royal Naval Air Service; and whether the promotion lists were equivalent of, and as authoritative as regards ratings, as was the official *Gazette* in regard to officers?

Mr. Churchill: Promotions of Royal Naval Air Service ratings were promulgated in Royal Naval Air Department Temporary Memoranda, a series of temporary orders circulated to all Royal Naval Air stations. These were regarded as authoritative, and were used in connection with the adjustment of the pay of the ratings concerned. The promotions of officers were published in the *London Gazette* or in the daily lists of appointments circulated by the Admiralty to Naval Commanders-in-Chief, Senior Naval Officers, etc.

Paris Air Mail

LIEUT.-COL. GUINNESS on July 8 asked the Postmaster-General whether, in view of the fact that only about one letter in every 700 is now carried by the Air Mail to the Continent, he will now reduce the present prohibitive rate of 2s. 2½d. charged for that route?

Mr. Illingworth: An air mail service from London to Amsterdam has recently been established with a special air fee of 3d. per ounce; and, subject to the concurrence of the French Government, I hope to be able shortly to introduce a correspondingly low fee in the service to Paris.

Continental Telegrams

LIEUT.-COL. W. GUINNESS asked the Postmaster-General whether he can give any estimate as to the average time which will be required for telegrams at ordinary rates to reach destinations in France, Italy, and Holland, respectively, in view of the new arrangement under which urgent telegrams are to be accepted for those countries at treble rates?

Mr. Illingworth: Urgent telegrams to the Continent paid for at triple rates form at present only 2½ per cent. of the total traffic. Their introduction has not, therefore, appreciably affected the time occupied in the transmission of telegrams sent at ordinary rates, and it is not anticipated that they will cause any appreciable increase in the future.

Lieut.-Col. W. Guinness: Can the right hon. gentleman say what is the average time at present, and whether there is a very serious congestion to explain this enormous treble rate which is being charged?

Mr. Illingworth: I think it varies from time to time, but I will make inquiries and give my hon. and gallant friend some instances of it. The charge is being put on to make sure that urgent telegrams shall be released in a short time.

Lieut.-Col. W. Guinness: The right hon. gentleman has not answered my question at all. Is there any explanation for the congestion which this betokens in the telegraph service, apart from the inefficiency of the Department?

Discharge by Purchase from R.A.F.

Mr. WATSON, on July 9, asked the Secretary of State for Air whether discharge by purchase is applicable to the Royal Air Force Reserve, Class E?

Mr. Churchill: The answer is in the affirmative. Regulations regarding discharge by purchase from the Royal Air Force will be shortly promulgated.

From Sweden to Gotland

QUITE a good performance was that of Maj. Lees, O.B.E., A.F.C., and Captain Saunders, D.F.C., A.F.C., in flying from Sweden to Visby, in the island of Gotland, a distance of 60 miles, over the Baltic, in a thick fog. It is believed that this is the first flight that has been made from the mainland to Gotland.

New York to Alaska and Back

EIGHT U.S. military flying officers, mounted on four DeH. 4 two-seaters equipped with Liberty motors have been detailed to start from New York on July 15 for a trip to Alaska and back, a distance of 9,742 miles. The object is to lay out a route for commercial aviation and 45 days have been allotted for the round trip.

THE ROYAL AIR FORCE

London Gazette, July 6

Flying Branch

Sec. Lieut. E. Leicester to be Lieut.; Oct. 8, 1918 (since demobilised).
Pilot Officers to be Flying Officers.—L. C. Cody; Oct. 1, 1919 (since demobilised). E. G. Breen; Feb. 29. Pilot Officer G. A. Shipton to be Observer Officer; Feb. 19 (since demobilised). Flying Officer G. E. Creighton is placed on the Half-Pay List (Scale B); July 4. Flying Officer H. Munden, D.F.C. (Lieut., Som. L.I.), relinquishes his temp. R.A.F. commn. on return to Army duty; June 17.

(Then follow the names of 7 officers who are transfd. to the Unemployed List under various dates.)

The following Lieuts. relinquish their commns. on account of ill-health and are permitted to retain their rank:—A. G. D. Alderson (Worc. R. (S.R.)) (caused by wounds); June 26. J. Valentine (caused by wounds); June 29. E. L. Capreol (contracted on active service); July 2. Lieut. A. McK. Matheson (R.F.A.) relinquishes his commn. on account of ill-health caused by wounds; July 1.

Lieut. (Hon. Capt.) R. N. C. Fenton relinquishes his commn.; March 18, 1919 (substituted for Gazette, April 1, 1919).

Administrative Branch

Pilot Officers to be Flying Officers.—H. E. Davies (since demobilised) (substituted for Gazette Oct. 28, 1919). W. F. Swan (since demobilised). J. G. Woodgett; Oct. 1, 1919.

(Then follow the names of 3 officers who are transfd. to the Unemployed List under various dates.)

Sec. Lieut. A. Ashby relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; June 28.

Technical Branch

Capt. A. S. Goodwin to be Capt., Grade (A), from (A. and S.); July 13, 1918. (Substituted for notification in the Gazette of July 26, 1918.)

Flying Officer A. J. Briddon to be Flying Officer, Grade (A), from Grade (B), Aug. 9, 1919, and is graded for purposes of pay and allowances as Flight Lieut. whilst employed as Flight Lieut. (Grade A); Aug. 9, 1919.

Sec. Lieuts. to be Lieuts., Grade (B).—H. W. Dunk; March 16, 1919 (since demobilised). W. F. Arnold; May 16, 1919 (since demobilised). E. W. Jenkins; June 6, 1919 (since demobilised). R. P. Coulter; July 24, 1919 (since demobilised).

Pilot Officers to be Flying Officers, Grade (A).—G. T. H. Field; Oct. 1, 1919 (since demobilised). I. M. Gee; Jan. 3 (since demobilised).

Pilot Officers to be Flying Officers, Grade (B).—W. Bingham (since demobilised), R. E. Hardy (since demobilised); Oct. 1, 1919. P. Collins; Feb. 27 (since demobilised). Pilot Officer A. H. Harrison to be Flying Officer; Oct. 1, 1919. Sec. Lieut. E. W. Jenkins to be Sec. Lieut., Grade (B), from Grade (A); June 6, 1919.

(Then follow the names of 9 officers who are transfd. to the Unemployed List under various dates.)

Lieut. T. A. Burns relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; Aug. 11, 1919 (substituted for notification in the Gazette of July 22, 1919). The notification in the Gazette of June 29 concerning Flying Officer A. J. Briddon is cancelled.

Memoranda

(Then follow the names of 49 Cadets granted hon. commns. as Sec. Lieuts.)

Sec. Lieut. E. James relinquishes his commn. with permission to retain his rank; March 14, 1919.

London Gazette, July 9

Permanent Commissions

Flying Officer W. H. Ellison (T.) is granted a permanent commn. in the rank stated, with effect from Aug. 1, 1919 (substituted for Gazette, July 2, but does not affect Gazette, Nov. 28, 1919).

Flight Lieut. A. M. Waistell, D.S.C., relinquishes his commission on account of ill-health, and is permitted to retain his rank; (July 10).

Short Service Commissions

Flight Lieut. A. S. Goodwin (T.) is granted a short service commn. in the rank stated, with effect from July 9.

The following temporary appointments are made at the Air Ministry:—**Deputy Directors.**—Lieut.-Col. C. L. Courtenay, C.B.E., D.S.O., from Director, Lieut.-Col. A. Fletcher, C.B.E., M.C., from Director; May 1, 1919.

Flying Branch

Fight Lieut. R. Collishaw, D.S.O., D.S.C., D.F.C., is graded for purposes of pay and allowances as Sqdn. Leader while employed as Sqdn. Leader (A.), from Aug. 1, 1919, to April 22. Flight Lieut. J. C. Brooke, D.S.C., is restored to the Active List; Dec. 1, 1919. Flight Lieut. J. C. Brooke, D.S.C., is placed on the Half-Pay List (Scale A); Aug. 7, 1919. Flying Officer A. H. E. Lindop, M.C. (Capt., I.A.U.O.), relinquishes his temp. R.A.F. commn. on reversion to I.A.R.O.; June 23.

(Then follow the names of 11 officers who are transfd. to the Unemployed List under various dates.)

Lieut. (Hon. Capt.) H. P. Valentine relinquishes his R.A.F. Commn., and is permitted to retain the rank of Capt.; July 13, 1919 (substituted for Gazette, July 29, 1919). Sec. Lieut. (Hon. Lieut.) C. A. Overbury relinquishes his R.A.F. commn., and is permitted to retain the rank of Lieut.; Feb. 18, 1919 (substituted for Gazette, April 4, 1919). Lieut. R. H. Edleston relinquishes his commn. on account of ill-health caused by wounds, and is permitted to retain his rank; July 3. Sec. Lieut. F. G. Mills relinquishes his commn. on account of ill-health caused by wounds, and is permitted to retain his rank; July 3.

Administrative Branch

Sec. Lieut. P. Harvey to be actg. Lieut. while employed as Lieut.; April 1, 1918. Lieut. (temp. Capt.) H. E. Pooley relinquishes his commn. on ceasing to be employed; April 18, 1918.

(Then follow the names of 6 officers who are transfd. to the Unemployed List under various dates.)

Technical Branch

(Then follow the names of 19 officers who are transfd. to the Unemployed List under various dates.)

Memoranda

Proby. Flight Officer J. Marshall is granted a temp. commn. as Sec. Lieut. with effect from Feb. 15, 1919.

(Then follow the names of 16 Cadets granted hon. commns. as Sec. Lieuts.)

The following Proby. Flight Officers are granted hon. commns. as Sec. Lieuts.:—G. R. C. Soutar; Dec. 14, 1918. D. S. Fraser; Jan. 3, 1919. A. C. Rowdon; April 16, 1919.

Sec. Lieut. J. Marshall relinquishes his commn., and is permitted to retain his rank; Sept. 29, 1919.

Personals

Deaths

Col. CHARLES E. DUDLEY, managing director of the Anglo-American Oil Co., Ltd., died suddenly on the evening of July 8 at Hampstead. He was playing in the American Golf Club competition at Hanger Hill on Wednesday. Born in Pennsylvania in 1865, his business career had always been identified with Standard Oil interests, and he took a prominent part in the extension and development of the company's business, not only in England but also abroad. During the War he was head of the petroleum section of the American Army.

WILLIAM HENRY MCCUDDEN, of Burton Road, Kingston, Surrey, died in Wandsworth Hospital on July 6, the result of injuries received by a fall from an electric train. Mr. McCudden had served for 28 years in the Royal Engineers, and of his three sons, who lost their lives in the War, the eldest, the late Major J. B. McCudden, V.C., D.S.O., M.C., M.M., was credited with bringing down 57 German machines.

Flt. Officer ALEXANDER J. MACQUEEN, of No. 12 Air Squadron, the only squadron now in the Army of Occupation, who was accidentally killed, on July 5, while flying, was the son of Mr. J. MacQueen, of Shanklin, I.O.W.

Married

Flt.-Lieut. PHILIP CLERMONT LIVINGSTON, R.A.F., M.S., B.A.Cantab. M.R.C.S., D.P.H., son of the late Mr. Clermont Livingston, of Cowicham Lake, Vancouver Island, and Mrs.

Livingston, 28, FitzJames Avenue, West Kensington, was married on July 8, at St. Mary Abbot's, Kensington, to LORNA MURIEL, only daughter of Mr. and Mrs. LEGASSICKE-CRESPIN, late of 51, West Cromwell Road, Kensington, and Modbury, Devon.

CLARENCE EDWARD WILLIAM LOCKYER, R.A.F., only son of J. E. Lockyer, A.M.I.C.E., of Kingsbridge, was married on July 1, at St. Etheldreda's Church, Hatfield, to DOROTHY REBECCA, elder daughter of J. MEASURES, of Roe Green, Hatfield.

To be Married

A marriage has been arranged, and will shortly take place, between Capt. H. T. HORSFIELD, A.F.C., R.A.F., and LILY, daughter of the late J. W. MUIR, I.C.S., of 7, Queen's Gate Gardens, S.W.

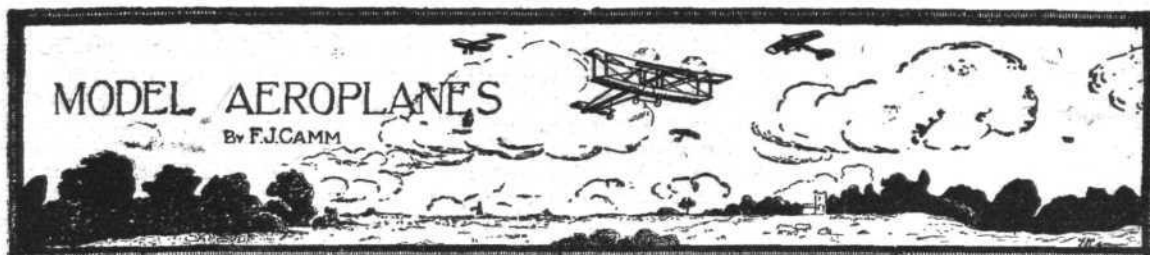
The engagement is announced, and the marriage will shortly take place, between Mr. J. J. W. NICHOLSON, D.F.C., of the R.A.F., and KATHLEEN MAUD, second daughter of the Rev. Canon and Mrs. SCOTT, of Douglas Rectory, Co. Cork.

A marriage has been arranged, and will take place at the Cathedral of St. Omer, on July 19, between Flt.-Lieut. C. PORRI, M.A. (Oxon), Barrister-at-Law, and Mlle. JEANNE MARIE CANONNE, younger daughter of Mme. Canonne and the late Mr. Léon Canonne, Officier de l'Ordre de Nichan-iftikhar (Tunis), of St. Omer, Pas-de-Calais, France.

Double Fatality at Kenley

CAPTAIN OSWALD VICTOR REYNOLDS, Royal Air Force, and Air Mechanic Braithwaite were killed in an aeroplane accident at Kenley Aerodrome on July 12. They ascended in

a machine for a test flight at 11 a.m., but on reaching a height of between two and three hundred feet the engine appeared to back-fire and stop and the machine crashed to the ground. Both occupants were killed and the wreck caught fire.



All communications to be addressed to the Model Editor. A stamp should be enclosed for a postal reply

Exhibits at the Aero Show

THE model portion of the Aero Show, although of somewhat attenuated proportions compared to those of the dim and hoary pre-War days, nevertheless was symptomatic of a recrudescence of pre-War activities.

The H.P. Club Display

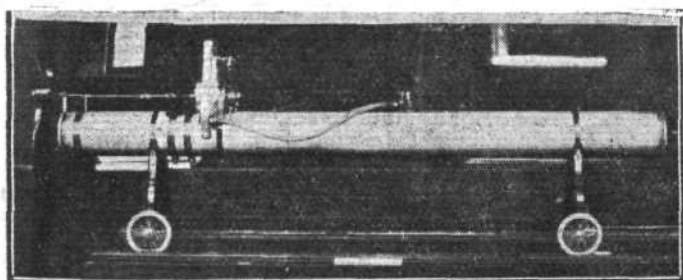
One club only (the Handley Page Model Club, under the energetic secretaryship of Mr. A. B. Hudson) exhibited, with a collection of 16 models made by members as follows:—Mr. G. P. Applebee, built-up-fuselage biplane, r.o.g. type; Mr. R. Davy, biplane embodying an interesting system of all-wire construction; Mr. A. B. Hudson, built-up-fuselage biplane; Mr. D. W. Wilson, a covered-in biplane, ingeniously thought out; Mr. N. A. Turner, tractor monoplane; Mr. A. V. Piper, pusher-type monoplane; Mr. M. H. Taylor, tractor biplane; Mr. E. Sutton, glider for testing weather conditions; Mr. A. N. Clifton, pusher model of the 1-1-P2 type; Messrs. N. A. Turner and G. P. Applebee, twin-screw pusher type hydroplane; Mr. R. Sheen, scale model 0/400 Handley Page; Mr. C. A. Pearce, scale model Ponnier monoplane, also a scale model "Avro Baby"; Messrs. A. B. Hudson and D. W. Wilson, scale model D.H. 9; "The Club," scale model V.1500 Handley Page, built by the members in collaboration, and Mr. A. E. Mitchell, a twin fuselage tractor biplane.

Messrs. A. E. Jones, Ltd., 57, High Street, New Oxford Street, London, W. 1.—This firm, the oldest accessory firm in England, had on view a fine collection of flying models which were departures from the usual "flying stick" type, possessing built-up and covered-in fuselages and double surfaced wings which were extremely pleasing in proportion and exceptionally well finished. After the vicissitudes of the model aeroplane movement, and the arrival and departure of many new firms, it is particularly gratifying to see one firm standing "four square to all the winds that blow." Messrs. Jones, have progressed with the times; their stock has been consistently and thoroughly revised from time to time, in consonance with the fluctuations of popular favour. A type that is obsolete is not foisted on the market by means of the bolster of blatant advertisement, but has been superseded by newer and more up-to-date models. The firm obviously is run on engineering lines; everything is standardised and made to jig, thus rendering them interchangeable.

Quite an innovation from the commercial point of view is their hollow spar with the elastic motor enclosed. An inspection door near the front admits of view so that one may ascertain the condition of the gears (if such are used) and also the elastic.

An interesting section of the business, too, is the non-flying scale models, which are accurately scaled from the prototype; quite a large range of these were shown.

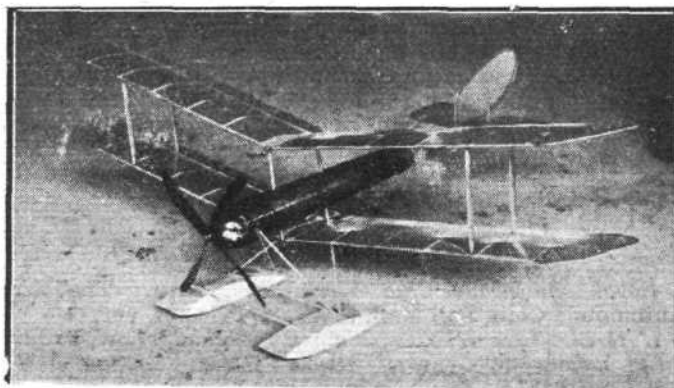
Also on exhibition on this firm's stand was the "Reely" compressed-air motor, an ingenious and well-made plant, capable, it is claimed, of developing nearly $\frac{1}{2}$ h.p. The plant is a sound engineering job, and is of the three-cylinder fan type, with cam and tappet operated valves. As soon as particulars are available I shall refer to this interesting unit in greater detail. The accessories shown on the stand included samples of model aeroplane accessories, such as various sections of wood, carved propellers, ribs, shaped hollow spars;



The "Reely" compressed air plant which is being introduced by Messrs. A. E. Jones, Ltd.

steel wire, elastic, dope, varnish, lubricants, glue, proofed fabric, aluminium wheels, tangent spoke wheels, propeller winders, ball-bearing brackets, model wire strainers, eyebolts, bolts and nuts, screw eyes, steel nails, cup washers, propeller shafts, brass brackets, axles; streamline struts and other small parts for model aeroplane construction.

The photographs herewith show some of the lines mentioned. **D.A.P. Model Aero Engineering Co.,** 185, Replingham Road, Southfields, London, S.W. 18.—Scale models of full-size aircraft, compressed air plants and models, elastic driven models, materials, parts, accessories and gliders are features of this firm's business, examples of most of them being on exhibition. Bearing in mind the many years Mr. Paveley has given to the flying of models, one is pleased to hear of him doing well in the business. One interesting c.a. driven



A Paveley model water-plane, with compressed air plant made by the D.A.P. Model Aero Engineering Co.

hydroplane chassis was on show, together with their well-known plants which are meeting with popular favour. One is glad to notice a growing tendency among aero-modellists to make power-driven machines. The fact that previously there were only a few foreign-made plants of the genus rubbish on the market precluded many from making "power-driven" machines; but now that firms such as those here dealt with are undertaking their manufacture, there is no reason why the compressed-air system should not have a vogue equally as popular as the rubber motor.

This firm also supply complete machines driven by their power unit, and some interesting photos. were shown of them in flight and well-up.

(To be Continued)

To Calculate the Horse-Power of a Rubber Motor

ASSUME the screw is wound to 500 turns, that it runs down in 20 secs., and the mean thrust is 3 oz., pitch being 15 ins., and mean speed 1,100 r.p.m. The number of foot-pounds of energy developed=

$$\frac{3 \text{ oz.} \times 1,100 \times 1\frac{1}{2} \text{ ft. pitch}}{16 \text{ oz.}}$$

$$= 258 \text{ ft. lb. per min. approx.}$$

Since the motor runs down in 20 secs., the energy actually developed=

$$\frac{258 \times 20}{60} = 86.0 \text{ ft. lb.}$$

The motor develops power in the order

$$\frac{258}{33,000} = .0079 \text{ h.p., but for 20 secs. only.}$$

Replies to Correspondents

A.S. (St. Margaret's).—I duly forwarded your letter and replied direct.

A. E. P. (Portsmouth).—You have probably heard from Mr. Groves ere this. With tractor machines the centre of thrust should certainly be slightly above the centre of resistance to overcome the stalling effect.

H. I. (Stroud).—Many thanks for the drawings.

SIDEWINDS

MESSRS. MANN, EGERTON AND CO., LTD., have just produced a little booklet which briefly and concisely gives a complete résumé of all their various departments and their individual activities, together with different depôts, etc., of one of the largest and most progressive firms in East Anglia. East Anglia is, for the motorist, one of the most beautiful sections of England which he can choose to reside in, or tour in, and whether he lives in the city or in the country he will find that by dealing with Mann, Egerton he can obtain all he requires both for motoring and for his estate and house, and obtain same at standard prices. Copies of the booklet can be obtained from any Mann, Egerton depôt.

WE are informed by Vickers, Ltd., that at the conclusion of the action brought by Admiral Sir Percy Scott against the company in connection with the sales of his inventions, Sir Trevor Dawson placed his resignation in the hands of the chairman of the company. The board, being satisfied that Sir Trevor Dawson's action throughout was correct, declined to accept his resignation.

THOSE who are looking for a flying machine at a low price will be interested in the announcement made by the Central Aircraft Company, that they intend to shortly place on the market a two-seater triplane, the price of which will be £250 complete. The motive power will be a 45 h.p. engine, and it is stated the machine will have a maximum speed of 90 m.p.h., and a range of 400 miles, bringing Paris, Brussels and Rotterdam within the scope of non-stop flights. It is expected that the petrol consumption will be slightly under 4 gallons per hour, which will give a little over 25 miles to the gallon. The machine will be simple in construction, safe and easy to fly, with a factor of safety of 8-1. The wing span will be 17 ft., so that the machine can be housed in a small shed or garage.

PUBLICATIONS RECEIVED

- Royal Automobile Club Year Book, 1920. The Royal Automobile Club, Pall Mall, S.W. 1. Price 5s. net.
- L'Aéronautique Hier-Demain.* By Commandant Orthlieb. "Les Leçons de Guerre" Series. Paris: Masson et Cie., 120, Boulevard Saint-Germain. Price 9 fr. net.
- Aero Dictionary: English-French, French-English.* By Leonard Hemslowe. London: Benn Brothers, 8, Bouverie Street, E.C. 4. Price, 5s. net; post free, 5s. 6d.
- Die Deutschen Luftstreitkräfte im Weltkrieg.* By G. P. Neumann. Berlin: E. S. Mittler and Son, Kochstrasse 68-71. Price, paper covers, 38 marks; bound, 55 marks.
- Airplane Performance as Influenced by the Use of a Supercharged Engine.* By George de Bothezat. Technical Notes, No. 2. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.
- Report No. 62: Effect of Altitude on Radiator Performance.* National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.
- Report No. 63: Results of Tests on Radiators for Aircraft Engines.* National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.
- Report No. 65: The Kiln Drying of Woods for Airplanes.* National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.
- Report No. 73: The Design of Wind Tunnels and Wind Tunnel Propellers.* National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.
- Report No. 77: The Parker Variable Camber Wing.* By H. F. Parker. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.
- Report No. 83: Wind Tunnel Studies in Aerodynamic Phenomena at High Speed.* National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.
- Technical Note No. 3: Notes on the Theory of the Accelerometer.* By E. P. Warner. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.
- Technical Note No. 4: The Problem of the Helicopter.* By E. P. Warner. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.
- Technical Note No. 5: Relation of Rib Spacing to Stress in Wing Planes.* By A. F. Zahm. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Catalogue

Galvanizing, Welding and Sheet Metal Work. Thos. Marshall and Son, Armley Road, Leeds.

IMPORTS AND EXPORTS, 1919-1920

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; and for 1919, see "FLIGHT" for January 22, 1920.

	Imports.		Exports.		Re-Exportation.	
	1919.	1920.	1919.	1920.	1919.	1920.
January ...	555,989	2,323	57,571	32,752	—	697
February ...	453,822	9,320	57,972	68,932	—	—
March ...	704,424	2,092	72,716	67,600	400	—
April ...	97,662	5,918	25,433	148,484	—	—
May ...	136,631	761,425	38,428	237,627	—	400
June ...	1,410	491	41,526	300,572	—	61,150
	1,949,938	781,569	293,646	855,967	400	62,247

The London-Amsterdam Mail

THE aerial mail between London and Amsterdam, under the contract secured by Handley Page Co., made a successful start on the morning of July 6, when a De H.9 set out from Cricklewood, in the presence of Gen. Sir F. H. Sykes and Col. Waterhouse, and landed safely at her destination.

New York to Toronto by Flying Boat

LIEUT.-COL. BARKER and Captain Morse, with a mechanic, arrived at Toronto from New York on July 8 in a flying-boat equipped with a 425 h.p. engine and carrying six passengers.

AERONAUTICAL PATENTS PUBLISHED

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors

APPLIED FOR IN 1919

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Published July 15, 1920

- 3,621. BRITISH OXYGEN Co., S. W. BRAY and I. H. BALFOUR. Production of hydrogen. (144,751.)
- 6,562. J. W. CAWDERY. Parachutes. (144,792.)
- 8,354. H. N. WYLIE, R. H. ATCHERLEY and W. C. J. SCHLIE. Metal aerofoil ribs. (144,828.)
- 9,725. W. F. SAVAGE and B. H. MALLINSON. Combined radiator and air intake for aircraft. (144,838.)
- 11,411. SPOWTH AVIATION AND ENGINEERING Co., F. I. BENNETT and V. W. EYRE. Lubrication of I.C. engines. (144,847.)
- 13,472. F. H. PAGE. Aeroplanes. (144,867.)
- 14,209. SPERRY GYROSCOPE Co. Gyroscopic compasses. (127,830.)

If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages 1, li and lii).

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